

# External I/O Expansion Unit Installation and Service Manual







# External I/O Expansion Unit Installation and Service Manual

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# Preface

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This manual describes the procedure for installing the External I/O Expansion Unit on the SPARC Enterprise M4000/M5000/M8000/M9000 servers. This manual also provides information on the proper use and maintenance of the system.

This manual is intended for engineers, system administrators, authorized service providers (ASP), and users possessing a high degree of knowledge about hardware troubleshooting and switching.

This section includes:

- [“Structure and Contents of This Manual” on page xv](#)
- [“SPARC Enterprise Mx000 Servers Documentation” on page xvi](#)
- [“Text Conventions” on page xix](#)
- [“Prompt Notations” on page xix](#)
- [“Syntax of the Command Line Interface \(CLI\)” on page xx](#)
- [“Environment Requirements for Using This Product” on page xx](#)
- [“Conventions for Alert Messages” on page xxi](#)
- [“Notes on Safety” on page xxii](#)
- [“Product Handling” on page xxiv](#)
- [“Fujitsu Welcomes Your Comments” on page xxvi](#)

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## Structure and Contents of This Manual

This manual consists of the following eight chapters.

- [Chapter 1 Overview](#)

This chapter provides a summary of the External I/O Expansion Unit.

- [Chapter 2 Installing the External I/O Expansion Unit in a Cabinet](#)

This chapter describes the procedure for installing the External I/O Expansion Unit.

- [Chapter 3 Working with PCI Cards](#)  
This chapter describes the procedure for mounting PCI cards.
- [Chapter 4 Servicing and Replacing Components](#)  
This chapter describes the procedure for maintaining this product.
- [Appendix A Specifications](#)  
This chapter describes the physical specifications, electrical specifications, and installation specifications.
- [Appendix B External I/O Expansion Unit LED Status Indicators](#)  
This chapter describes the LED display.
- [Appendix C PCI Cards and Device Mapping](#)  
This chapter describes the OpenBoot™ PROM Device Tree for the External I/O Expansion Unit.
- [Appendix D Troubleshooting](#)  
This chapter describes the troubleshooting tips.

## Glossary

- [Glossary](#)  
Explains the terms used in this manual.
- [Index](#)  
Provides keywords and corresponding reference page numbers so that the reader can easily search for items in this manual as necessary.

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# SPARC Enterprise Mx000 Servers Documentation

The manuals listed below are provided for reference.

Book Titles	Manual Codes
SPARC Enterprise M4000/M5000 Servers Site Planning Guide	C120-H015
SPARC Enterprise M8000/M9000 Servers Site Planning Guide	C120-H014
SPARC Enterprise Equipment Rack Mounting Guide	C120-H016

<b>Book Titles</b>	<b>Manual Codes</b>
SPARC Enterprise M4000/M5000 Servers Getting Started Guide	C120-E345
SPARC Enterprise M8000/M9000 Servers Getting Started Guide	C120-E323
SPARC Enterprise M4000/M5000 Servers Overview Guide	C120-E346
SPARC Enterprise M8000/M9000 Servers Overview Guide	C120-E324
Important Safety Information for Hardware Systems	C120-E391
SPARC Enterprise M4000/M5000 Servers Safety and Compliance Guide	C120-E348
SPARC Enterprise M8000/M9000 Servers Safety and Compliance Guide	C120-E326
External I/O Expansion Unit Safety and Compliance Guide	C120-E457
SPARC Enterprise M4000 Server Unpacking Guide	C120-E349
SPARC Enterprise M5000 Server Unpacking Guide	C120-E350
SPARC Enterprise M8000/M9000 Servers Unpacking Guide	C120-E327
SPARC Enterprise M4000/M5000 Servers Installation Guide	C120-E351
SPARC Enterprise M8000/M9000 Servers Installation Guide	C120-E328
SPARC Enterprise M4000/M5000 Servers Service Manual	C120-E352
SPARC Enterprise M8000/M9000 Servers Service Manual	C120-E330
External I/O Expansion Unit Installation and Service Manual	C120-E329
SPARC Enterprise M4000/M5000/M8000/M9000 Servers RCI Build Procedure	C120-E361
SPARC Enterprise M4000/M5000/M8000/M9000 Servers Administration Guide	C120-E331
SPARC Enterprise M4000/M5000/M8000/M9000 Servers XSCF User's Guide	C120-E332
SPARC Enterprise M4000/M5000/M8000/M9000 Servers XSCF Reference Manual	C120-E333
SPARC Enterprise M4000/M5000/M8000/M9000 Servers Dynamic Reconfiguration (DR) User's Guide	C120-E335
SPARC Enterprise M4000/M5000/M8000/M9000 Servers Capacity on Demand (COD) User's Guide	C120-E336
SPARC Enterprise M4000/M5000/M8000/M9000 Servers RCI User's Guide	C120-E360
SPARC Enterprise M4000/M5000 Servers Product Notes	C120-E347
SPARC Enterprise M8000/M9000 Servers Product Notes	C120-E325
External I/O Expansion Unit Product Notes	C120-E456

## 1. Manuals on the Web

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Global Site

<http://www.fujitsu.com/sparcenterprise/manual/>

Japanese Site

<http://primeserver.fujitsu.com/sparcenterprise/manual/>

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**Note** – Product Notes is available on the website only. Please check for the recent update on your product.

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## 2. Documentation CD

For the Documentation CD, please contact your local sales representative.

- SPARC Enterprise M4000/M5000 Servers Documentation CD (C120-E365)
- SPARC Enterprise M8000/M9000 Servers Documentation CD (C120-E364)

## 3. Manual included on the Enhanced Support Facility x.x CD-ROM disk

- Remote maintenance service

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Book Title	Manual Code
Enhanced Support Facility User's Guide for REMCS	C112-B067

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## 4. Provided in system

Man page of the XSCF

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**Note** – The man page can be referenced on the XSCF shell, and it provides the same content as the *SPARC Enterprise M4000/M5000/M8000/M9000 Servers XSCF Reference Manual*.

---

## 5. Solaris Operating System Related Manuals

<http://docs.sun.com>

---

# Text Conventions

This manual uses the following fonts and symbols to express specific types of information.

Fonts/symbols	Meaning	Example
<b>AaBbCc123</b>	What you type, when contrasted with on-screen computer output	XSCF> <b>adduser jsmith</b>
AaBbCc123	The names of commands, files, and directories; on-screen computer output	XSCF> <b>showuser -p</b> User Name: jsmith Privileges: useradm auditadm
<i>Italic</i>	Indicates the name of a reference manual	See the <i>XSCF User's Guide</i> .
" "	Indicates names of chapters, sections, items, buttons, or menus	See Chapter 2, "Preparation for Installation."

---

# Prompt Notations

The following prompt notations are used in this manual.

Shell	Prompt Notations
XSCF	XSCF>
C shell	<i>machine-name%</i>
C shell super user	<i>machine-name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell super user	#
OpenBoot PROM	ok

---

# Syntax of the Command Line Interface (CLI)

The command syntax is as follows:

- A variable that requires input of a value must be enclosed in <>.
- An optional element must be enclosed in [ ].
- A group of options for an optional keyword must be enclosed in [ ] and delimited by |.
- A group of options for a mandatory keyword must be enclosed in {} and delimited by |.
- The command syntax is shown in a box.

Example:

XSCF> **showuser -a**

---

# Environment Requirements for Using This Product

This product is a computer that is intended to be used in a computer room.

---

# Conventions for Alert Messages

This manual uses the following conventions to show alert messages, which are intended to prevent injury to the user or bystanders as well as property damage, and important messages that are useful to the user.

## WARNING:

This indicates a hazardous situation that could result in death or serious personal injury (potential hazard) if the user does not perform the procedure correctly.

## CAUTION:

This indicates a hazardous situation that could result in minor or moderate personal injury if the user does not perform the procedure correctly. This signal also indicates that damage to the product or other property may occur if the user does not perform the procedure correctly.

## IMPORTANT:

This indicates information that could help the user to use the product more effectively.

## Alert Messages in the Text

An alert message in the text consists of a signal indicating an alert level followed by an alert statement. Alert messages are indented to distinguish them from regular text. Also, a space of one line precedes and follows an alert statement.

## WARNING:

The tasks listed below for this product and optional product provided by Fujitsu Siemens Computers should be performed only by authorized service personnel.

The user must not perform these tasks. Incorrect operation of these tasks may cause electric shock, injury, or fire.

- Installation and reinstallation of all components
- Removal of front, rear, or side covers
- Mounting/unmounting of optional internal devices
- Connecting/disconnecting of external interface cables
- Maintenance (repair and regular diagnosis and maintenance)

Also, important alert messages are shown in [“Important Alert Messages” on page xxii](#).

---

## Notes on Safety

### Important Alert Messages

This manual provides the following important alert signals:



---

**Caution** – The WARNING signal indicates a dangerous situation could result in death or serious injury if the user does not perform the procedure correctly.

---

---

Task	Warning
Normal operation	<b>Electric shock, fire</b> Do not damage, break, or modify the power cables. Cable damage may cause electric shock or fire.

---





**Caution** – The CAUTION signal indicates a hazardous situation could result in minor or moderate personal injury if the user does not perform the procedure correctly. This signal also indicates that damage to the product or other property may occur if the user does not perform the procedure correctly.

Task	Warning
Normal operation	<p><b>Equipment damage</b></p> <p>Be sure to follow the precautions below when installing the main unit. Otherwise, the equipment may be damaged.</p> <ul style="list-style-type: none"><li>• Do not block ventilation slits.</li><li>• Avoid installing the equipment in a placed exposed to direct sunlight or near equipment that becomes extremely hot.</li><li>• Avoid installing the equipment in a dusty place or a place directly exposed to corrosive gas or salty air.</li><li>• Avoid installing the equipment in a placed exposed to strong vibration. Also, install the equipment on a level surface so that it is stable.</li><li>• The grounding wire must be class 3 or higher. Connecting it with another grounding wire for shared grounding may cause a malfunction. Be sure to use a single grounding path for the grounding wire.</li><li>• Do not run any cable beneath any equipment. Also, prevent cables from becoming taut. Never disconnect any power cable from the equipment while power is being supplied to the equipment.</li><li>• Do not place anything on top of the main unit. Do not use the main unit as a workspace.</li><li>• Avoid exposing the equipment to rapid changes in the ambient temperature, such as a rapid increase during transport in winter. A rapid increase in the ambient temperature causes moisture to condense in the equipment. Use the equipment only after the difference between its temperature and the ambient temperature is negligible.</li><li>• Avoid installing the equipment near a copy machine, air conditioner, or welding machine, which is noisy.</li><li>• Take preventive action to minimize static electricity at the installation location. Note that static electricity is easily generated in some carpets and can cause the equipment to malfunction.</li><li>• Confirm that the power supply voltage and frequency during operation match the rated values indicated on the equipment.</li><li>• Do not insert any object into an opening in the equipment. Components inside the equipment use high voltage. Conductive foreign matter, such as a metal object, inserted into the equipment, may cause a short circuit between components, resulting in fire, electric shock, or equipment damage.</li><li>• For maintenance of the equipment, contact your authorized service personnel.</li></ul>

Task	Warning
Normal operation	<p><b>Data destruction</b></p> <p>Confirm the items listed below before turning off the power. Otherwise, data may be destroyed.</p> <ul style="list-style-type: none"> <li>• All applications have completed processing.</li> <li>• No user is using the equipment.</li> <li>• When the main unit power is turned off, the Power LED on the operation panel is turned off. Be sure to confirm that the Power LED is off before turning off the main power (uninterruptible power supply [UPS], power distribution box, main line switch, etc.).</li> </ul> <p>If necessary, back up files before turning off the system power.</p> <p><b>Data destruction</b></p> <p>Do not forcibly stop a domain that is operating normally. Otherwise, data may be destroyed.</p> <p><b>Data destruction</b></p> <p>Do not disconnect the power cable from the AC power input while power is being supplied. Otherwise, data stored on hard disk units may be destroyed.</p>

## Product Handling

## Maintenance



**Caution** – Certain tasks in this manual should only be performed by a certified service engineer. User must not perform these tasks. Incorrect operation of these tasks may cause electric shock, injury, or fire.

- Installation and reinstallation of all components, and initial settings
- Removal of front, rear, or side covers
- Mounting/de-mounting of optional internal devices
- Plugging or unplugging of external interface cards
- Maintenance and inspections (repairing, and regular diagnosis and maintenance)



---

**Caution** – The following tasks regarding this product and the optional products provided from Fujitsu Siemens Computers should only be performed by a certified service engineer. Users must not perform these tasks. Incorrect operation of these tasks may cause malfunction.

---

- Unpacking optional adapters and such packages delivered to the users
- Plugging or unplugging of external interface cards

## Remodeling/Rebuilding



---

**Caution** – Any modification and/or recycling of this product and its components may be carried out only by a certified service engineer and must not be done by the customer under any circumstances. Otherwise, electric shock, injury or fire may result.

---

## Emission of Laser Beam (Invisible)



---

**Caution** – The main unit and high-speed optical interconnect cabinet contain modules that generate invisible laser radiation. Laser beams are generated while the equipment is operating, even if an optical cable is disconnected or a cover is removed. Do not look at any light-emitting part directly or through an optical apparatus (e.g., magnifying glass, microscope).

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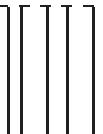
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FOLD AND TAPE

# Overview

---

The External I/O Expansion Unit provides a host server with additional slots for PCI cards.

- The single I/O boat configuration provides six slots for I/O cards.
- The optional two I/O boat configuration ([FIGURE 1-1](#)) provides twelve slots.

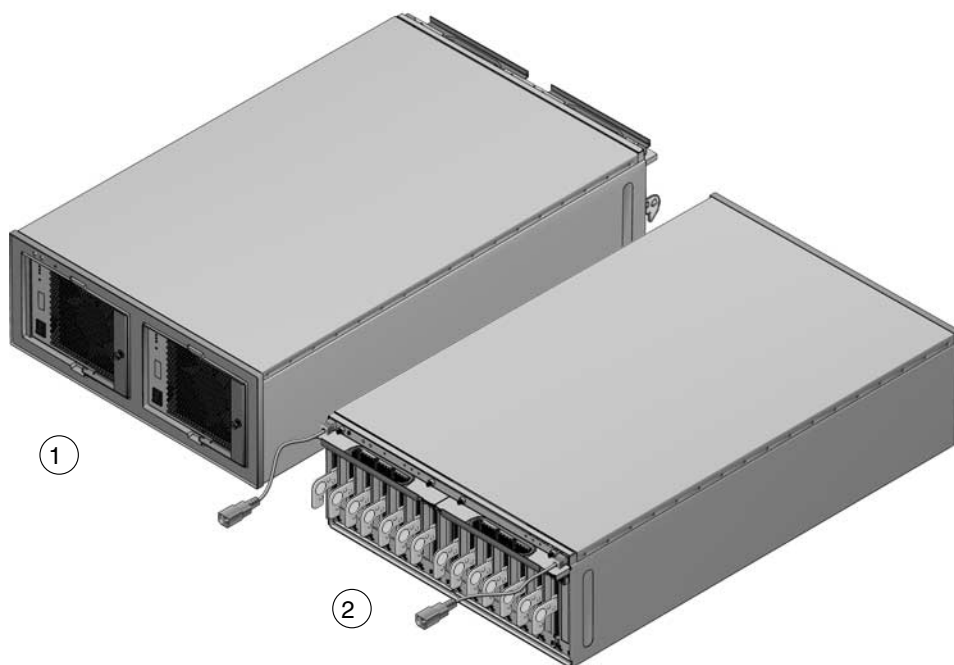
---

**Note** – The External I/O Expansion Unit may be described as I/O Box in programs and manuals.

---

This chapter contains the following topics:

- [General Description](#)
- [Card Slots](#)
- [Carriers](#)
- [External I/O Expansion Unit Configurations](#)
- [LEDs](#)
- [System Management](#)
- [Site Preparation](#)
- [Service Information](#)
- [Electrostatic Discharge Precautions](#)



**FIGURE 1-1** External I/O Expansion Unit, Front and Rear Views

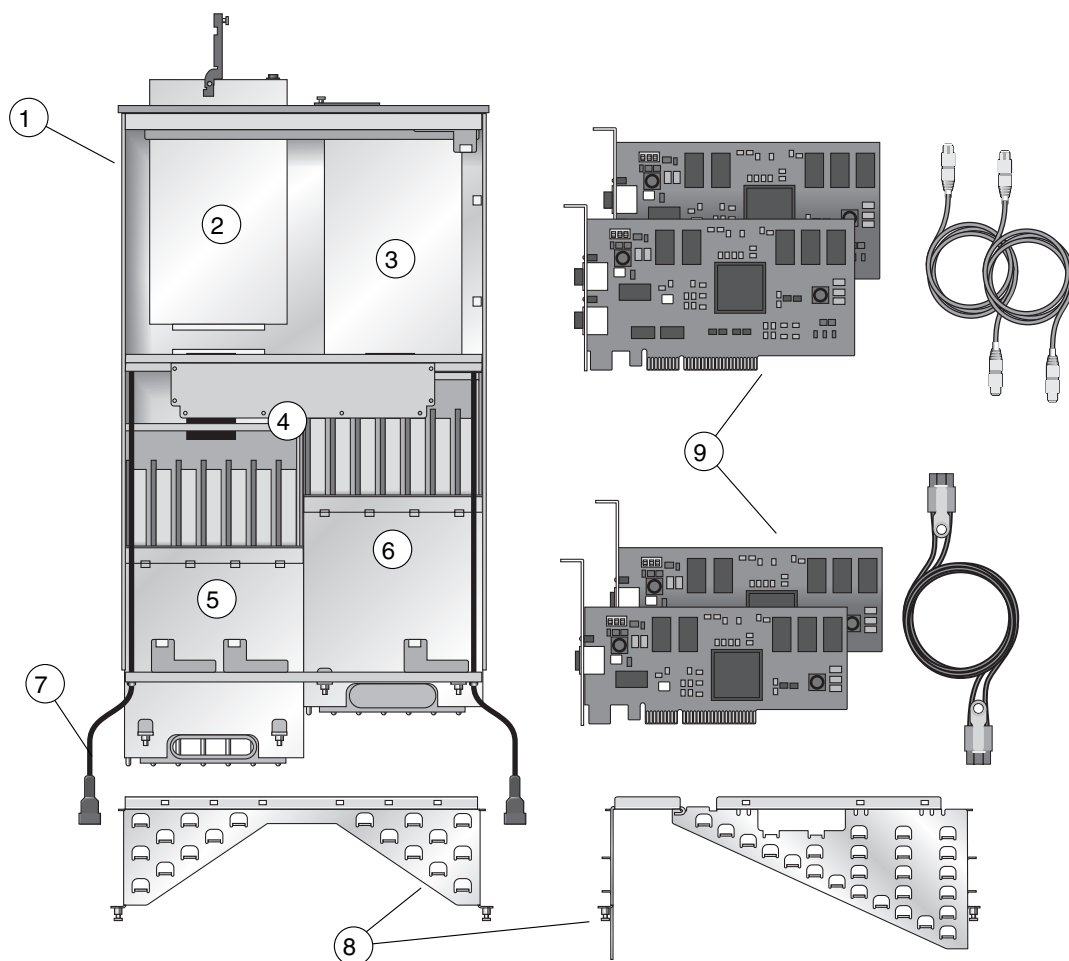
Item	Description
1	Front View
2	Rear View

## 1.1 General Description

**FIGURE 1-2** shows the major units for the External I/O Expansion Unit. These units are described separately in this chapter.

**Note** – All slot numbers run from left to right, regardless of whether you are viewing the front or the back of the External I/O Expansion Unit. At the front of the External I/O Expansion Unit, the power supplies are numbered from left to right. I/O boats at the rear of the External I/O Expansion Unit are also numbered from left to right.





**FIGURE 1-2** Major Units for the External I/O Expansion Unit, Top View

Item	Description	Item	Description
1	Chassis	6	I/O boat1
2	Power Supply Unit 1	7	Internal AC cable
3	Power Supply Unit 0	8	Cable management unit (one of two types is available)
4	Centerplane	9	Optical link kit or Copper link kit (two types are available)
5	I/O boat0		

## 1.1.1 Chassis

The External I/O Expansion Unit chassis includes the centerplane (item 4 in [FIGURE 1-2](#)) and two non-removable internal AC cables (item 6 in [FIGURE 1-2](#)).

There are no serviceable components inside the chassis. If the centerplane or the internal AC cables are damaged, the chassis must be replaced.

---

**Note** – A replacement chassis does not include power supply units (PSUs) or I/O boats. Transfer the PSUs and I/O boats from the damaged chassis to the replacement chassis.

---

Each internal AC cable supplies only one PSU. To ensure redundant power, use the two AC cords supplied with the External I/O Expansion Unit to connect the internal AC cables to separate AC sources.



---

**Caution** – Do not connect the internal AC cables directly to a power strip. Use the AC power cords supplied with the External I/O Expansion Unit to connect the internal AC cables to electrical power.

---



---

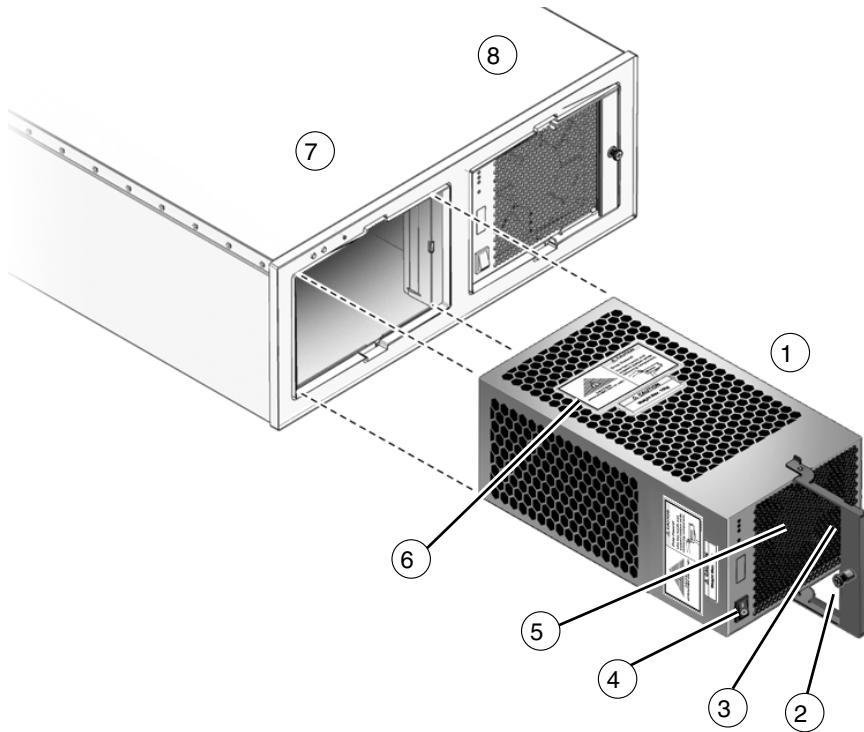
**Caution** – Do not substitute other AC power cords for the AC power cords supplied with the External I/O Expansion Unit. The substitute AC power cords may not have the same power rating.

---

## 1.1.2 Power Supply Units

The External I/O Expansion Unit has two power supply units (PSUs) for redundancy. See [FIGURE 1-3](#).

Each PSU includes an integral fan.



**FIGURE 1-3** Power Supply Unit

Item	Description
1	PSU
2	Handle
3	Handle locking screw
4	AC switch
5	Fan
6	Caution labels
7	PSU slot 0
8	PSU slot 1

### 1.1.2.1 AC Power

The PSU slots are powered through internal AC cables that extend out of the rear of the chassis ([FIGURE 1-2](#)).

The PSUs do not share AC current. Connect both internal AC cables to AC power.  
The internal AC cable for a PSU is the cable terminating nearest that PSU slot.

### 1.1.2.2 Fans

A fan is located in the front of each PSU. If one fan should fail, the remaining fan supplies enough air to cool two I/O boats.

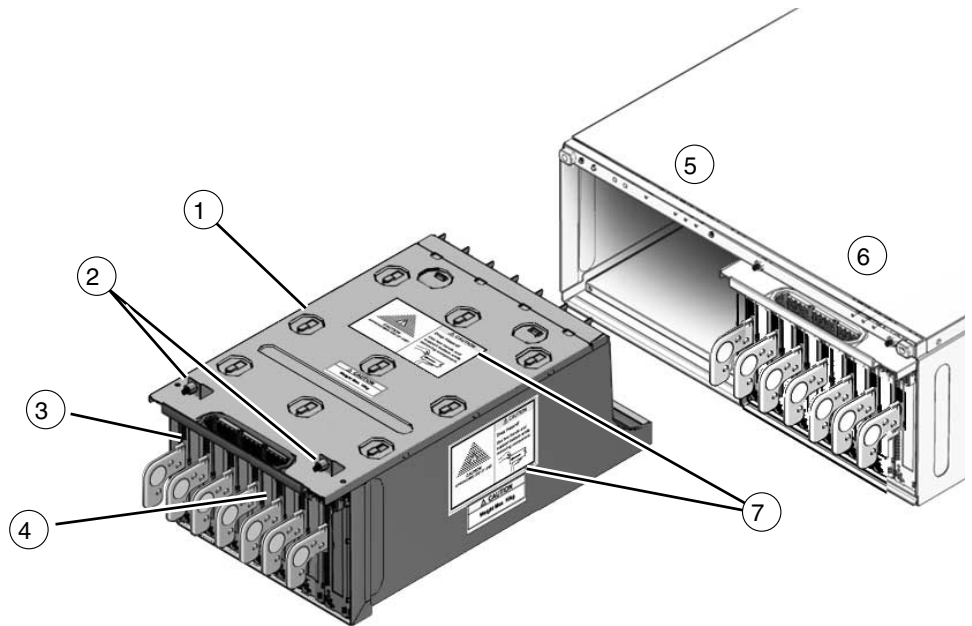
---

**Note** – The fan might turn on when you insert a PSU into the External I/O Expansion Unit. This is normal behavior if you are installing a second PSU while the first PSU is powered on. The fan receives DC power through the centerplane.

---

### 1.1.3 I/O Boats

The basic External I/O Expansion Unit configuration has one I/O boat. The second I/O boat (Boat slot 1 in [FIGURE 1-4](#)) is an available option.



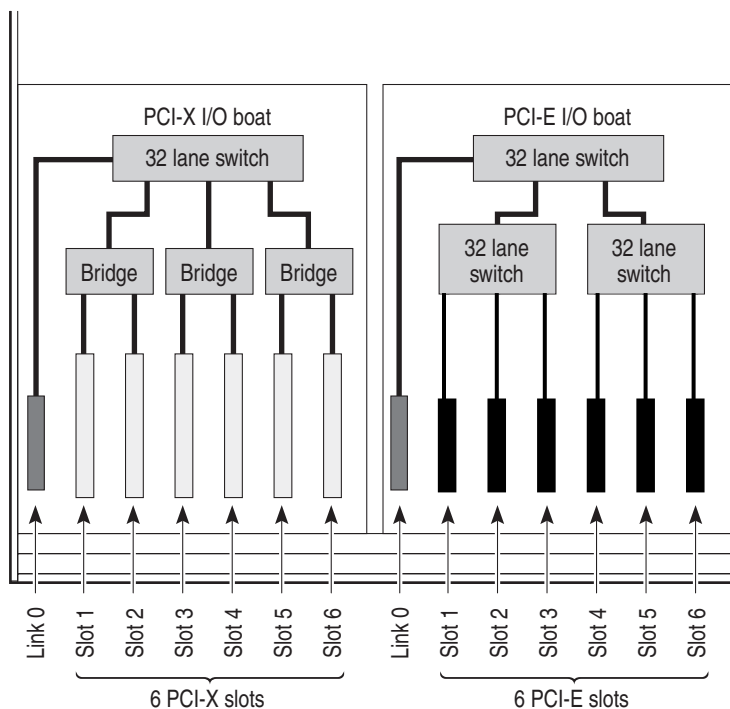
**FIGURE 1-4** I/O Boat

Item	Description
1	I/O boat
2	Captive screws
3	Link card carrier (slot 0)
4	PCI card carriers (slots 1-6)
5	Boat slot 0
6	Boat slot 1
7	Caution labels

### 1.1.3.1 Types of I/O Boat

There are two types of I/O boat, PCI-X and PCI Express. PCI cards are not interchangeable between the two types of boats.

- The PCI-X I/O boat accepts PCI-X cards and some older types of PCI cards.
- The PCI Express I/O boat accepts PCI Express cards up to x8 lanes wide. PCI Express x16 cards do not fit in this boat.



**FIGURE 1-5** PCI-X and PCI Express I/O Boat Layouts, Compared

A PCI-X I/O boat is shown on the left side of [FIGURE 1-5](#). This boat has six PCI-X sockets and one link socket.

A PCI Express I/O boat is shown on the right side. There are six PCI Express sockets and one link socket.

All PCI card data passes through the link card in the I/O boat.

A boat slot accepts either type of I/O boat.

---

**Note** – When you run system diagnostics, the switches and bridges are displayed in the output of OpenBoot™ PROM probing. However, the link cards themselves never appear during OpenBoot PROM probing. For examples of OpenBoot PROM output, see [Appendix C](#).

---

---

**Note** – Terms: A bridge is a device that converts PCI Express and PCI-X signal formats and connects multiple busses to a single bus. A switch is a device that connects multiple busses to a single bus, without converting the signals to another format.

---

---

## 1.2 Card Slots

The card slots have the following characteristics:

- An I/O boat has seven card slots. Slot numbers 0 through 6 are counted from left to right.
- Slot 0 is reserved for the link card. Slot 0 is the first slot in the left side of the I/O boat. For information about link cards, see [Section 1.2.2, “Link Kits” on page 1-12](#).
- Slots 1-6 are for PCI cards. (PCI cards are sometimes known as host adapters or host bus adapters.)
- PCI card slots are hot-pluggable.
- PCI-X and PCI Express sockets ([FIGURE 1-5](#)) are incompatible in length and height. Installing a PCI-X or PCI Express card in the wrong type of I/O boat will damage the card and the connector in the carrier slot.
- The PCI Express I/O boat supports up to x8 card sockets. PCI Express x16 cards are not supported in the PCI Express I/O boat.

---

**Note** – Graphics cards are not supported.

---



---

**Caution** – Do not insert a x16 PCI Express card in an I/O boat. The x16 card connector is too large for the x8 card socket and will damage the socket.

---

## 1.2.1 Carriers

All PCI cards in the External I/O Expansion Unit are mounted on carriers ([FIGURE 1-23](#)). Carriers control RFI emissions and maintain the proper flow of air through the External I/O Expansion Unit.

The front of each carrier is labelled with its slot number (PCIX 1 or PCIE 1, and so forth).

---

**Note** – Slot 0 is reserved for the link card. This slot is marked LINK 0.

---

There is only one type of carrier design used in the External I/O Expansion Unit. The same carrier fits all slots in both types of PCI-X and PCI Express boats. Note that carriers are physically keyed to fit only specific slot numbers, but the keys can be adjusted for other slots as needed.



---

**Caution** – If you install a PCI card when the External I/O Expansion Unit is running, be prepared to complete the installation within two minutes or so. If you leave a carrier slot empty for too long, the External I/O Expansion Unit might overheat.

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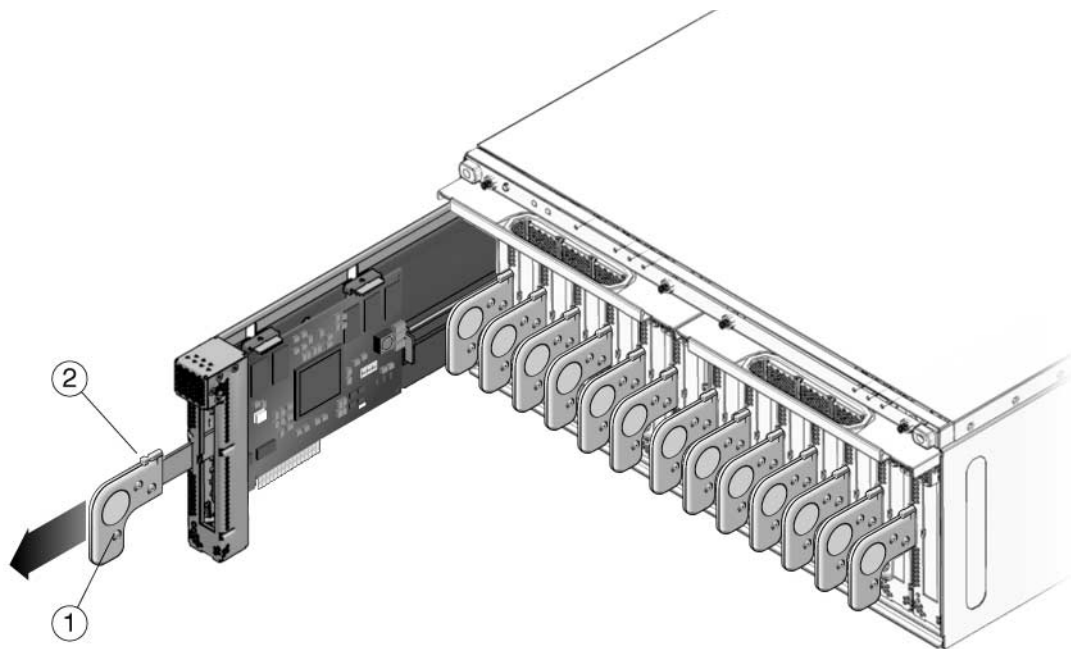
New carriers include dummy cards. The dummy cards help the carriers to stay in place and to control the passage of air through the I/O boat. For information about dummy cards, see [Section 1.2.1.2, “Dummy Cards” on page 1-11](#).

### 1.2.1.1 Carrier Slots

There are seven carriers in each I/O boat ([FIGURE 1-6](#)). Carriers can be adjusted to fit various sizes and shapes of PCI cards. Link cards use the same type of carrier.

- Carrier slot 0 is always used for the link card.
- Carrier slots 1 through 6 are used for PCI cards.





**FIGURE 1-6** PCI Carrier

Item	Description
1	Carrier handle
2	Carrier locking screw

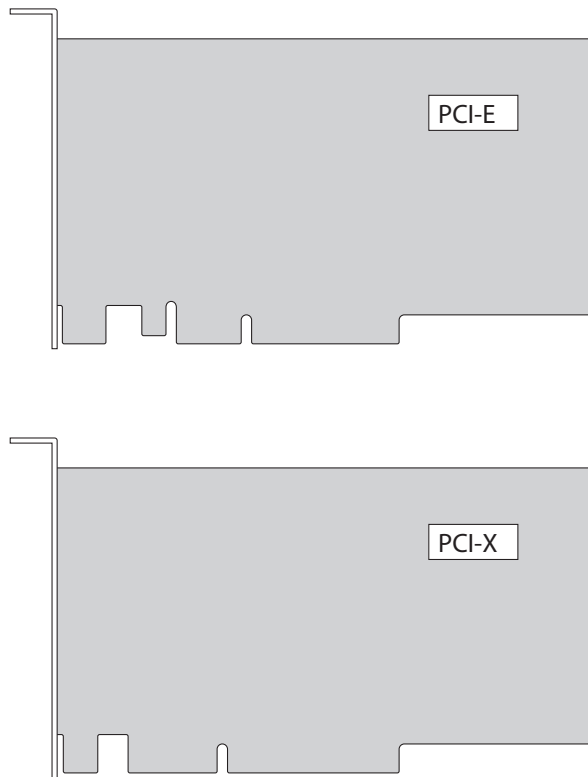
### 1.2.1.2 Dummy Cards

New carriers are shipped with dummy cards ([FIGURE 1-7](#)).

There are two types of dummy card, labeled PCI Express and PCI-X, respectively. The labels also include simplified instructions for removing and installing PCI cards.



**Caution** – The two types of dummy cards are not interchangeable. If you replace a PCI card with a dummy card, be sure that you use the right type of dummy card. The differences in edge connectors on the dummy cards ([FIGURE 1-7](#)) are enough to damage the PCI card socket on the I/O boat.



**FIGURE 1-7** Dummy Card Edge Connectors

Item	Description
1	PCI Express version
2	PCI-X version

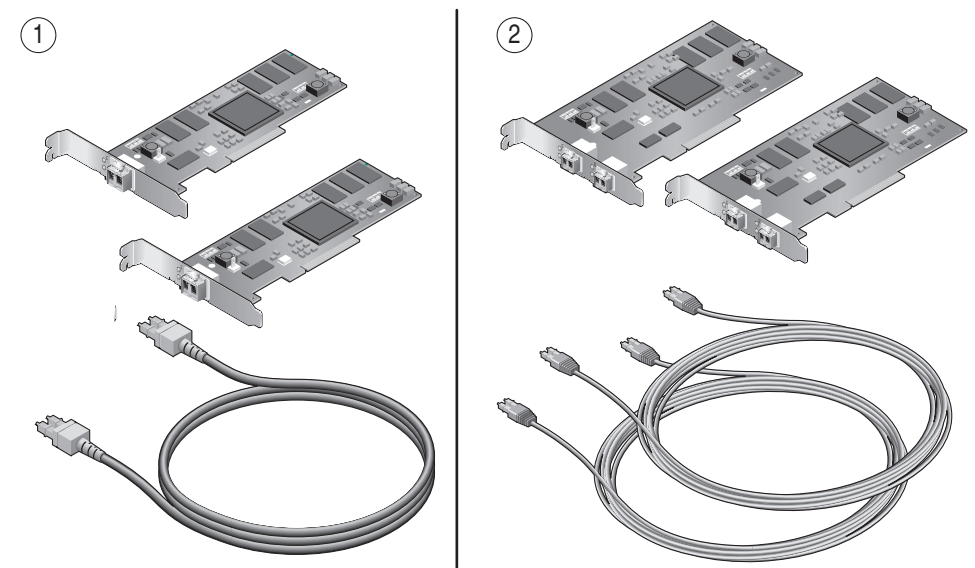
**Note** – Be certain that the dummy cards are fully seated. This action minimizes the vibration of unused carriers in the I/O boat slots.

## 1.2.2 Link Kits

One link kit is required for each I/O boat.

A link kit includes two link cards. One link card goes into the host server. The other link card goes into the I/O boat. The link cards are physically identical.

Two link kit options are available, copper-conductor and optical fiber (FIGURE 1-8). The copper-conductor link kit has one bidirectional cable. The optical link kit has two unidirectional cables.



**FIGURE 1-8** Link Kits

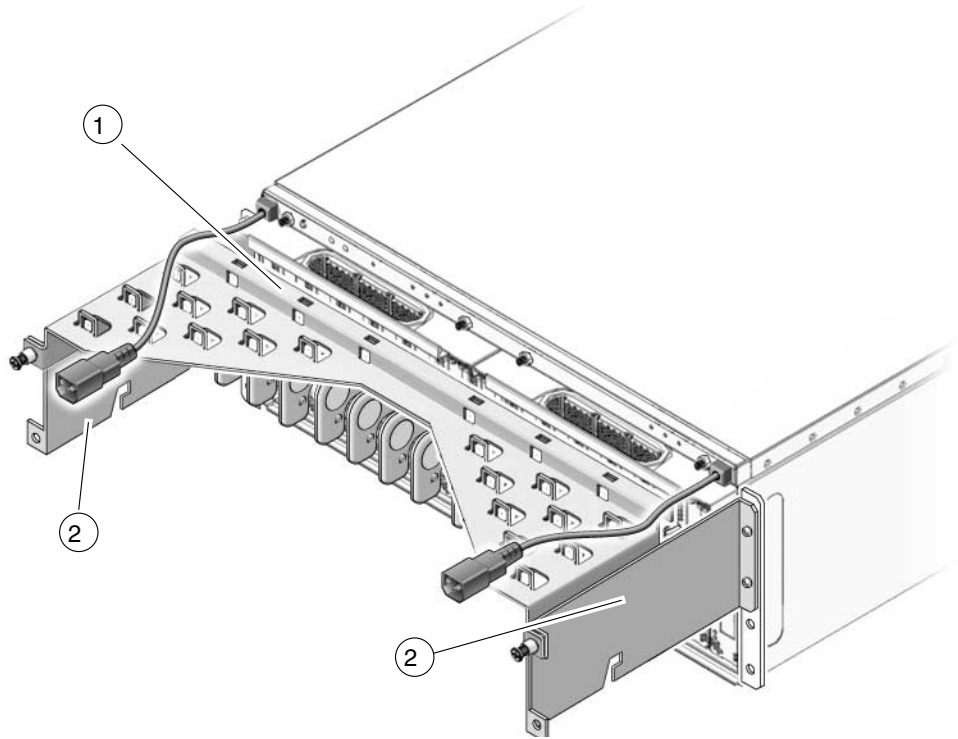
Item	Description
1	Copper-conductor link kit
2	Optical fiber link kit

Slot 0 in each I/O boat is the dedicated link card slot. Use slot 0 only for the link card.

## 1.2.3 Cable Management

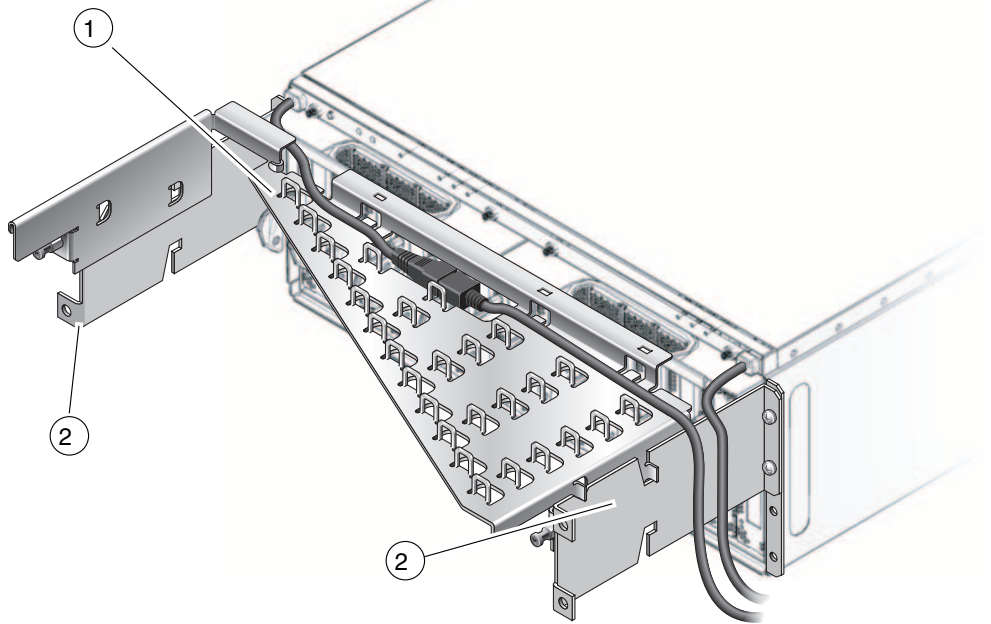
A cable management unit attaches to the rear of the system rack. There are two types of cable management units.

- **FIGURE 1-9** shows the unit used where cables can be routed to both the left and right sides of a rack. **FIGURE 3-17** shows this unit with cables.
- **FIGURE 1-10** shows the unit used where cables can be routed only along the right side of a rack. **FIGURE 3-18** shows this unit with cables.



**FIGURE 1-9** Cable Management Unit for Routing Cables to Both Sides of the Rack

Item	Description
1	Cable plate, type A
2	Support brackets



**FIGURE 1-10** Cable Management Unit for Routing Cables Only to the Right Side of a Rack

Item	Description
1	Cable plate, type B
2	Support brackets

**Note** – If the PSU1 power cable doesn't reach the rack power distribution unit, route the cable on the left side of the rack.

### 1.2.3.1 Minimum Bend Radius for Link Cables

The link cables might be damaged if they are coiled too tightly.

- The minimum bend radius for the copper link cable is 1.85 in. (47 mm).
- The minimum bend radius for optical fiber link cables is 1.8 in. (46 mm).



---

**Caution** – Coiling the link cables with a smaller bend radius than listed above will break the cables.

---

### 1.2.3.2 Cable Management Unit

The cable management unit contains two support brackets and a cable plate.

---

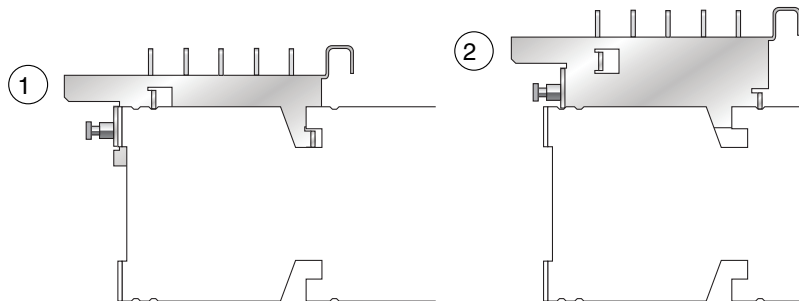
**Note** – Some cable management unit configurations include two types of cable plates.

---

The support brackets attach with screws to the rear of the system rack. The cable plate rests on the support brackets.

The cable plate has two resting positions ([FIGURE 1-11](#)).

- In the normal position, the cable plate rests on the support brackets.
- In the raised position, the cable plate rests slightly above the support brackets. This position provides clearance for you to remove and replace an I/O boat.



**FIGURE 1-11** Cable Plate (Side Views of Normal and Service Positions)

---

Item	Description
1	Cable plate in the normal position (lowered)
2	Cable plate in the service position (raised)

---

## 1.3 Carriers

In the I/O boat, all PCI cards are mounted on carriers. When you insert the carrier and card into the boat and push the carrier handle into the closed position, the carrier mechanism automatically seats the PCI card.

FIGURE 1-12 shows a carrier with an attached PCI card.

---

**Note** – The service life of a carrier is at least 100 PCI card insertions. To avoid premature failure of the carrier, do not repeatedly open and close the carrier more than is necessary to familiarize yourself with its operation.

---

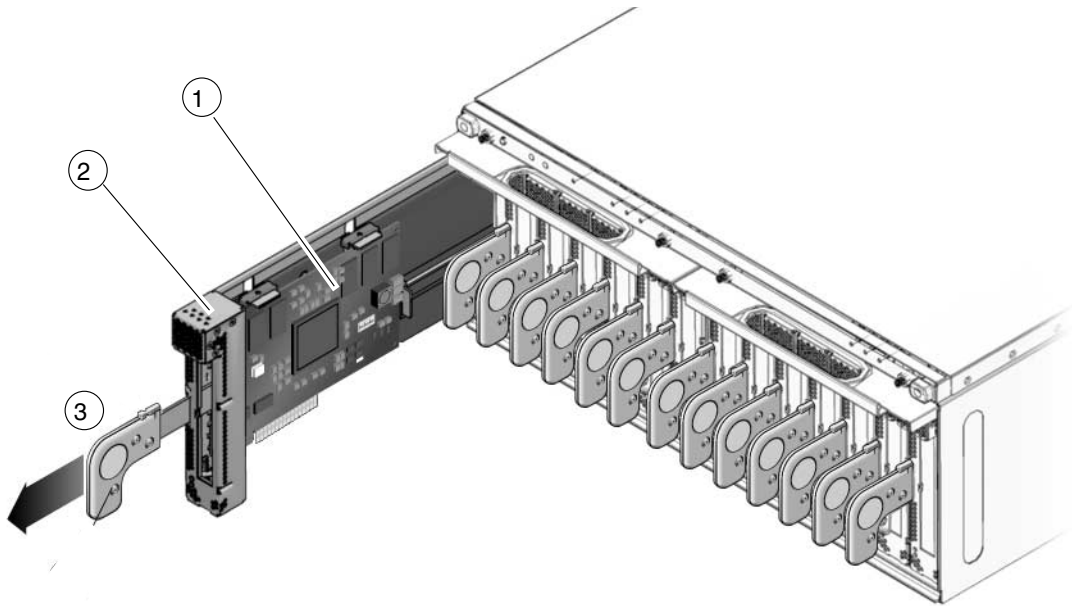
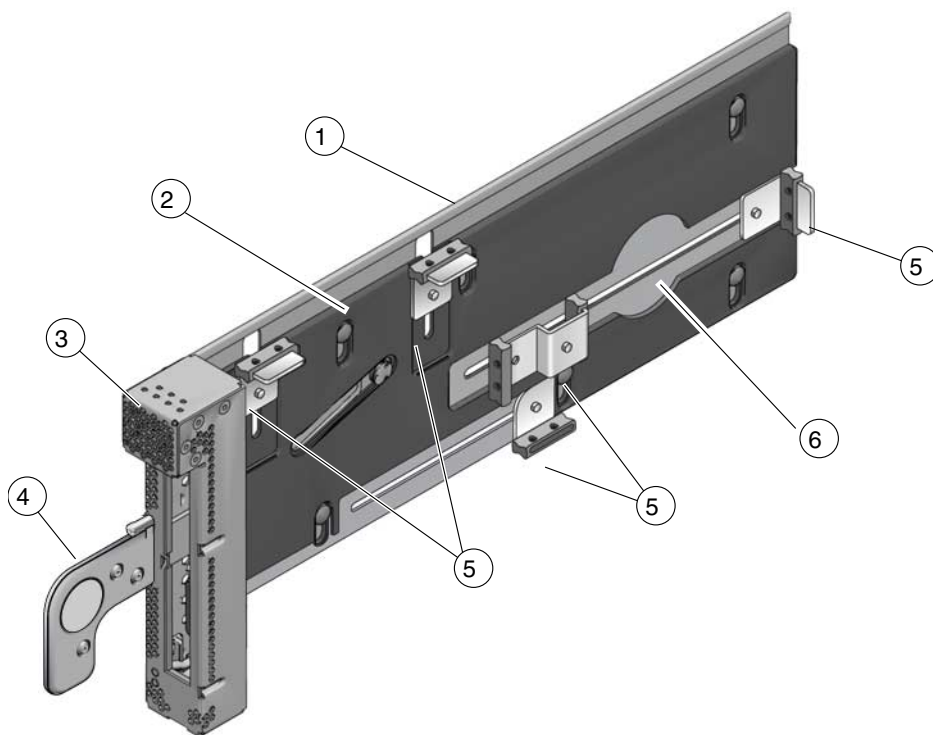


FIGURE 1-12 Carrier

Item	Description
1	PCI card
2	Carrier
3	Carrier handle in unlocked position

FIGURE 1-13 shows the details of a typical carrier.



**FIGURE 1-13** Carrier Features

Item	Description
1	Carrier main body (metal)
2	Carrier plate (plastic)
3	Carrier slot keyholes
4	Carrier handle
5	Card locks (5 are supplied with the carrier, in 3 types)
6	Turnaround area for card lock

## 1.3.1 Carrier Removal and Insertion

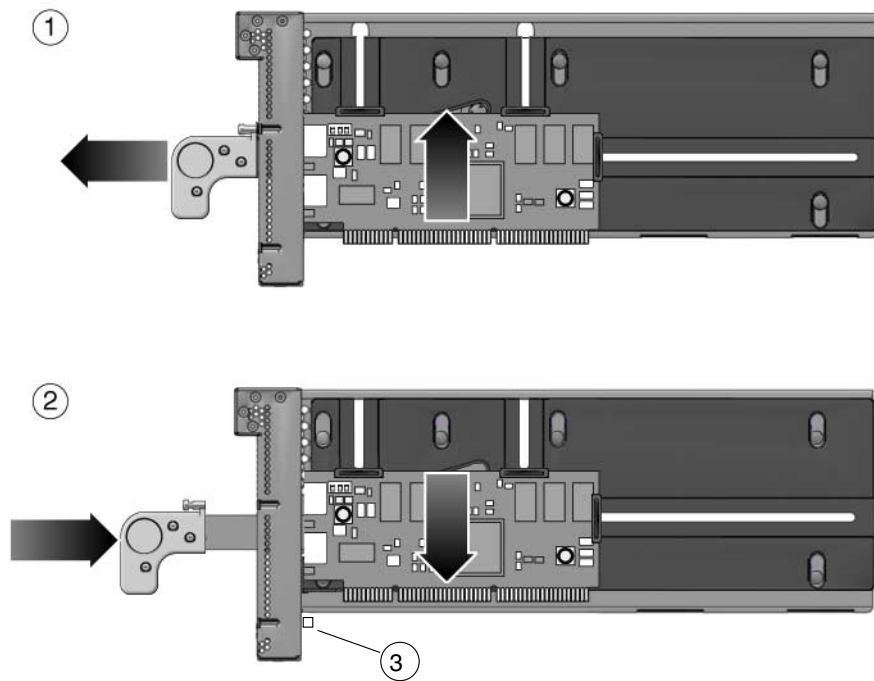
A carrier operates by raising or lowering a PCI card into or out of a card socket. The vertical movement is approximately 0.4 in (10 mm).



A small metal latch (item 3 in [FIGURE 1-14](#)) is located at the front of the carrier. The latch locks the carrier handle in the extended position. This action prevents the carrier plate and PCI card from falling and damaging the PCI slot connector as you pull the carrier unit out of the carrier slot.

After the carrier is out of the I/O boat, you can unlock the carrier handle by pushing in the metal latch while pushing the carrier handle into its closed position. Note that the closed position provides more vertical clearance for a PCI card when you install or remove the PCI card.

When you insert the carrier into the I/O boat, the latch automatically unlocks itself.



**FIGURE 1-14** Carriers

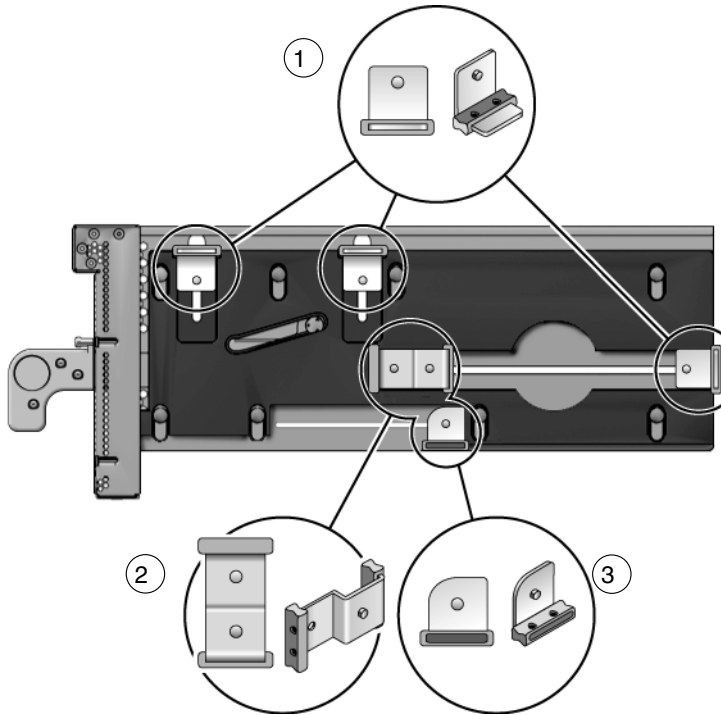
Item	Description
1	Pull carrier handle to raise PCI card out of PCI slot socket
2	Push carrier handle and latch (3) to lower PCI card into socket



**Caution** – All carriers must contain either a PCI card or a dummy card to avoid loss of cooling air.

## 1.3.2 Card Locks

A PCI card is attached to the carrier with screw-mounted locks or retainers (FIGURE 1-15). Card locks hold a PCI card to its carrier and prevent the PCI card from shifting or tilting. The PCI card must be securely mounted in order for the carrier to correctly seat the PCI card in the card socket in the I/O boat.



**FIGURE 1-15** Card Locks

Item	Description
1	Type A (Square). There are three of these.
2	Type B (S-shaped)
3	Type C (Small)

There are three types of locks:

- Type A is a square-shaped lock. Three of these are supplied with each carrier.

- Type B is an oblong lock that has an S-shaped profile. It provides a longer extension (0.75 inch, 19mm) than type A. Type B can be used as a top or side mount, wherever a longer reach is needed. One of this type is included with each carrier.
- Type C, a small quarter-round lock, can be used to support and align the bottom of the PCI card if bottom surface of the card permits. If there is insufficient available width (or overhang), this lock can be rotated to support the side of the card. This lock fits only the bottom slot on the carrier. One of this type is supplied with each carrier.

The most important functions of the locks are to secure the PCI card to the carrier and to apply a downward force to the top of the card to seat the card in the card socket when the carrier is inserted into the I/O boat. In addition, the locks help prevent the card from tilting so that card edge pins line up properly with the pins in the socket.

Because PCI card types are available in various sizes and shapes, you must choose a combination of card locks that is best suited to the size and shape of the PCI card.

FIGURE 1-15 shows the locks for a typical PCI card (and for dummy cards).

However, cards can be much wider or narrower, or taller or shorter. FIGURE 1-16, FIGURE 1-17, and FIGURE 1-18 show how cards can vary in height, width, and shape.

When installing a card, it might be necessary to swap locks from slot to slot in order to find the best way to secure a PCI card to its carrier. Use TABLE 1-1 to select locks that are best suited to your PCI card.

**TABLE 1-1** Card and Lock Styles

PCI Card Shape	Lock Type			Example
	Top	Side	Bottom	
Wide	Type A	Type A 12 in. (304 mm) maximum	Type C	FIGURE 1-16
Average width	Type A	Type A 5.75 in. (146mm) minimum Type B 5.0 in. (127mm) minimum	Type C	FIGURE 1-16
Narrow	Type A	Type A 5.75 in. (146mm) minimum Type B 5.0 in. (127mm) minimum Type C 3.0 in. (76mm) minimum		FIGURE 1-16

**TABLE 1-1** Card and Lock Styles *(Continued)*

PCI Card Shape	Lock Type			Example
	Top	Side	Bottom	
Very narrow	Type A	Type B 5.0 in. (127mm) minimum Type C 3.0 in. (76mm) minimum		<a href="#">FIGURE 1-16</a>
Tall	Type A	Type A or B	Type C	<a href="#">FIGURE 1-17</a>
Low	Type A 2.0 in. (51mm) minimum	Type A 5.75 in. (146mm) minimum	Type C	<a href="#">FIGURE 1-17</a>
	Type B 1.25 in. (31mm) minimum	Type B 5.0 in. (127mm) minimum		
		Type C 3.0 in. (76mm) minimum		
Very low and narrow	Type B 1.25 in. (31mm) minimum	Type C 3.0 in. (76mm) minimum		<a href="#">FIGURE 1-18</a>
Irregular shape	As needed	As needed	As needed	<a href="#">FIGURE 1-18</a>

1.3.2.1 PCI Card Shapes Determine Card Lock Locations

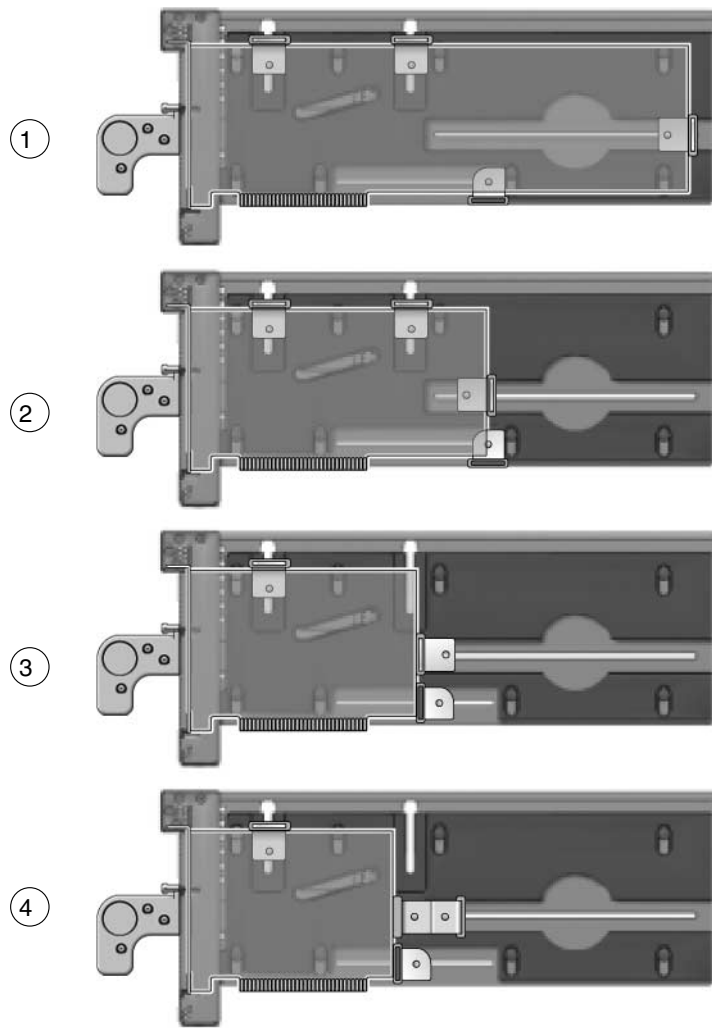
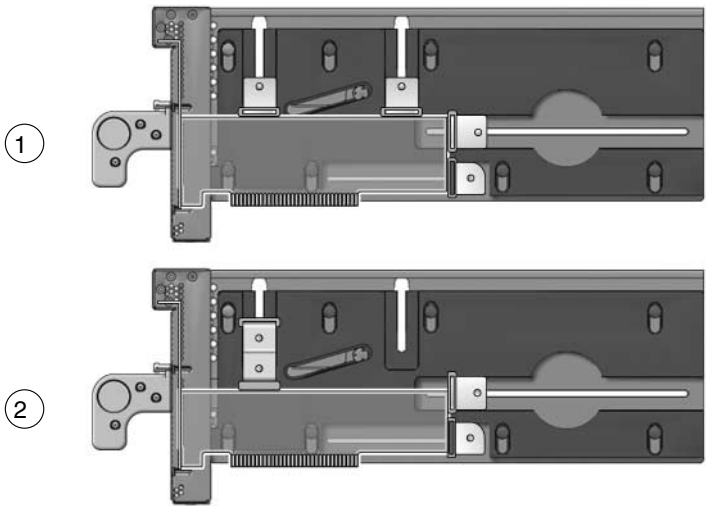


FIGURE 1-16 Lock Arrangements for Wide and Narrow PCI cards

Item	Description	
1	Wide card	2 type A on top, 1 type A on right, 1 type C on bottom

Item	Description	
2	Average card	2 type A on top, 1 type A on right, 1 type C on bottom
3	Narrow card	1 type A on top, 1 type A on right, 1 type C on bottom right
4	Very narrow card	1 type A on top, 1 type B on right, 1 type C on bottom right

### 1.3.2.2 Using Card Locks with Short PCI Cards



**FIGURE 1-17** Lock Arrangements for Short PCI cards

Item	Description	Arrangement
1	Low card:	2 type A on top, 1 type A on right side, 1 type C on bottom
2	Very low card:	1 type B on top, 1 type A on right edge, 1 type C on bottom.

1.3.2.3 Using Card Locks with Unusual Card Shapes

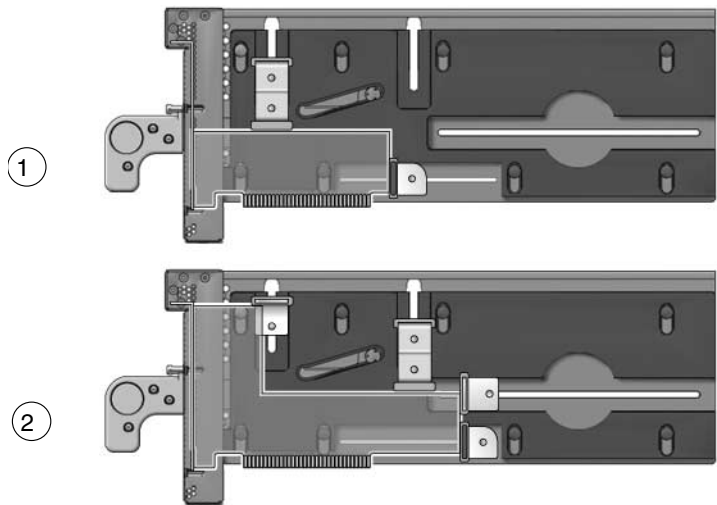


FIGURE 1-18 Lock Arrangements for Unusually-shaped Cards

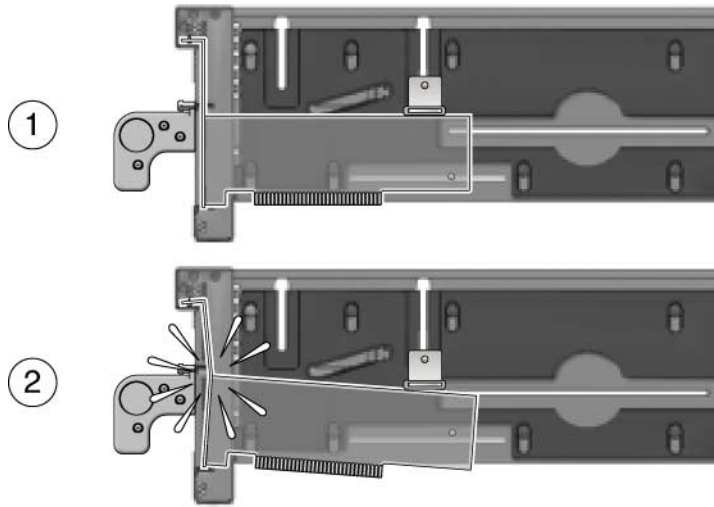
Item	Description	Arrangement
1	Very low and narrow card	1 type B on top, 1 type C on right side
2	Irregularly-shaped card	1 type A and 1 type B on top, 1 type A on right edge, 1 type C on bottom.

1.3.3 PCI Card Mounting Problems

1.3.3.1 Tilted Cards

There are two common problems that involve PCI cards that turn at an angle when mounted in PCI carriers.

- The most common problem is that a PCI card can slip and tilt during seating when you do not apply enough pressure on a PCI carrier card lock when mounting the card on the carrier.
- A less common problem is that the bracket of a PCI card will bend when you apply too much pressure on a PCI carrier card lock when mounting the card on a carrier.



**FIGURE 1-19** Excessive Force on a Lock Can Bend or Break the PCI Card

Item	Description
1	Correct
2	Incorrect

Here are some rules to avoid the tilting of PCI cards.

1. You must have at least one lock on top of the card. If the top of the card is too low to accept a lock, the card cannot be used.
2. If you can find a lock to fit the top of the card, your next priority is to provide side support to prevent the card from tilting. A tilted card ([FIGURE 1-19](#)) will not seat properly.
3. Support of the bottom of the card is not a major priority because the carrier plate itself provides some support for the bottom of the card.
4. Use only enough pressure to hold the lock against the PCI card. The bottom of the PCI card should stay parallel with the bottom of the carrier.

### 1.3.3.2 Hidden Problems

Three features are located inside the front housing of the carrier. Because they are difficult to see, they can complicate the mounting of cards on carriers.

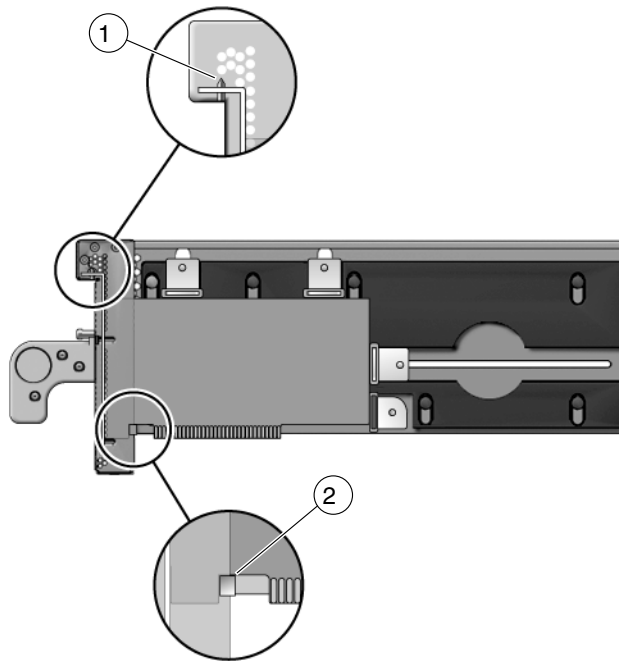
These features are:



- Card alignment post (FIGURE 1-20 and FIGURE 1-21)
- Card alignment tab (FIGURE 1-20)
- Internal RFI gasket (FIGURE 1-22)

### *Alignment Post and Alignment Tab*

The card alignment post and the card alignment tab help to keep the front of the PCI card in the correct vertical orientation, with support from properly-installed card locks.



**FIGURE 1-20** Card Alignment Post and Card Alignment Tab

Item	Description
1	Card alignment post
2	Card alignment tab

The post fits in a notch in the metal bracket of the PCI card (item 1 in FIGURE 1-20). If you do not position the post in the notch, the card mounting bracket might bend, so that the card lies at an angle on the carrier. The angle prevents the card from making proper electrical contact with the socket in the I/O boat.

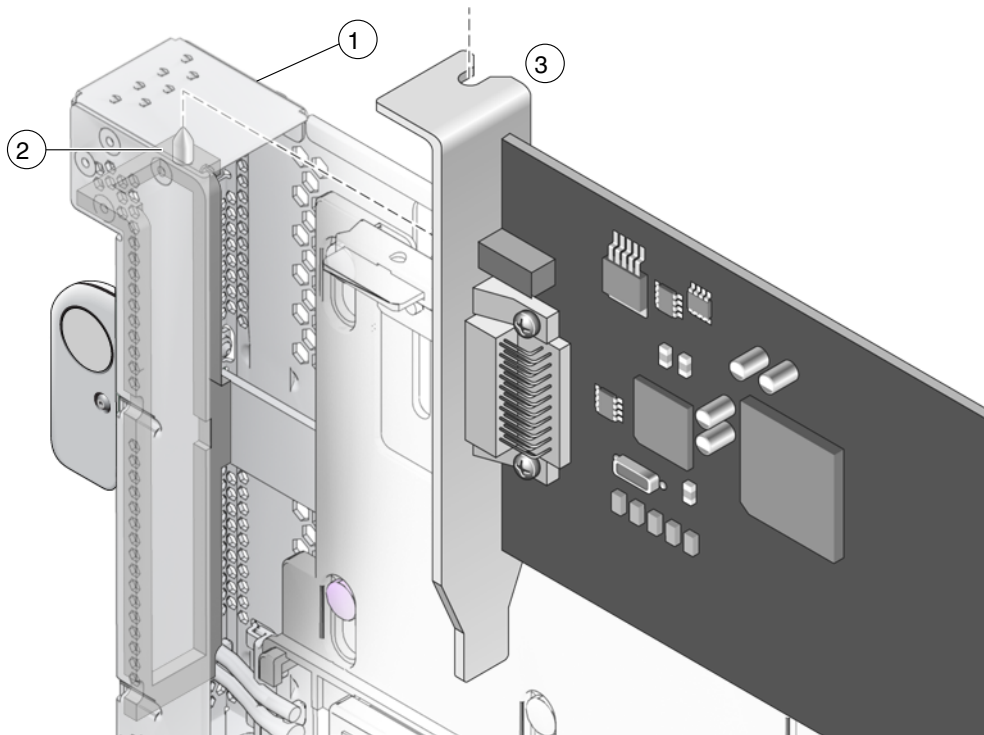
The tab (item 2 in [FIGURE 1-20](#)) fits in a notch at the bottom of the PCI card. The tab helps to align the card when you install it in the carrier. (Note that some card types might not have the notch)

---

**Note** – The tab lifts the front of the card out of the card connector when you remove the carrier from the I/O boat. If you cannot use a type C lock ([FIGURE 1-15](#)) to support the bottom of the PCI card, the card alignment tab is the only point that can provide support to lift the card out of the socket.

---

[FIGURE 1-21](#) shows how the bracket fits over the card alignment post.



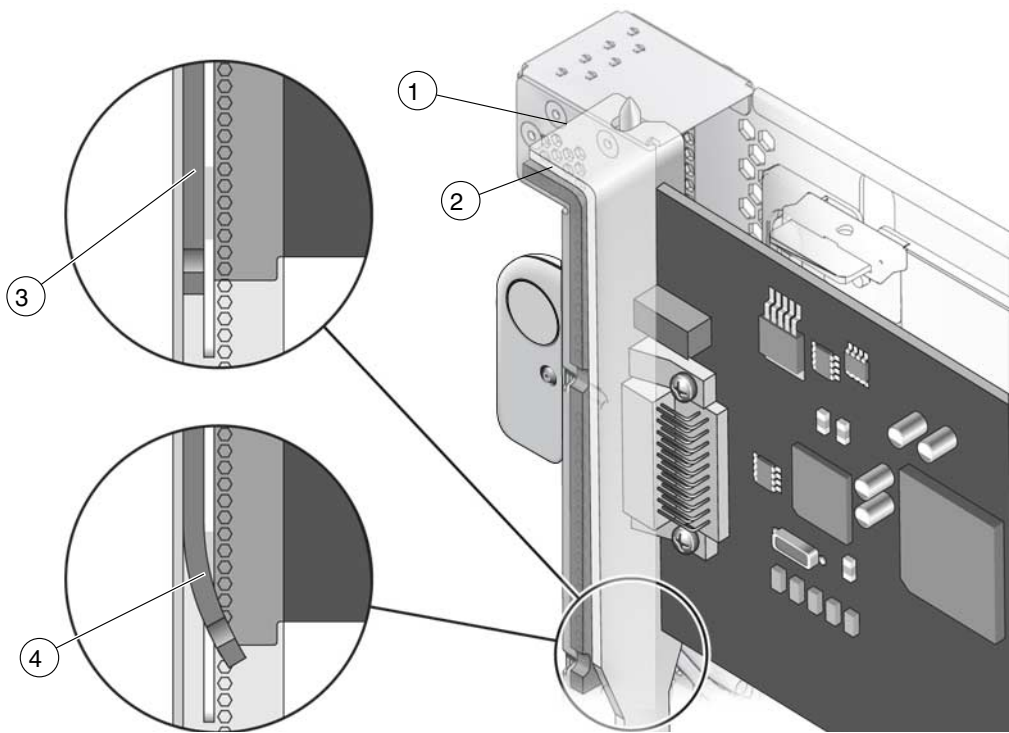
**FIGURE 1-21** Card Alignment Post (Detail)

Item	Description
1	Carrier front housing
2	Card alignment post
3	PCI card bracket

### Internal RFI Gasket

An RFI gasket is located inside the carrier housing, next to the card alignment post. (A smaller RFI gasket is located on the outside of the carrier housing.) When you insert the PCI card into the carrier, be sure that the bottom of the metal card bracket does not scrape or loosen the bottom of the gasket (FIGURE 1-22).

The gasket material is flexible enough that you might not notice that the bracket has dislodged the gasket. Remember to inspect the condition of this gasket before you install the carrier in the I/O boat.

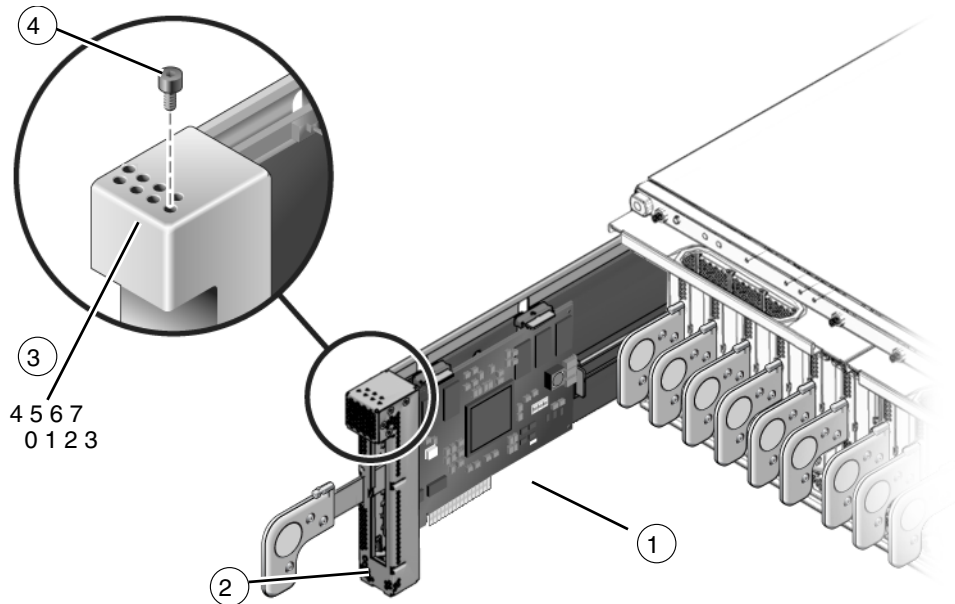


**FIGURE 1-22** Internal RFI Gasket

Item	Description
1	PCI card
2	RFI gasket (extends to the bottom front of the PCI carrier)
3	Correct example: the RFI gasket lies flat
4	Incorrect example: the card bracket has hooked behind the RFI gasket

## 1.3.4 Carrier Keys

Each carrier is keyed to a specific slot (FIGURE 1-23) in the I/O boat. The key is an M2 screw on the top of each carrier.



**FIGURE 1-23** Screw Hole Locations for the Carrier Slot Key

**TABLE 1-2** Carrier Keys

Row Location	Hole Number
Front	0 (Link Card), 1, 2, 3
Rear	4, 5, 6, 7*

\* Hole 7 is not used in current configurations.

If you replace a carrier, install the key in the keyhole that corresponds to the slot that you use. A replacement carrier includes one key. It also includes an assortment of labels. Affix the appropriate label (LINK 0, PCIE *n*, or PCIX *n*) to the front of the replacement carrier for easy identification.

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## 1.4 External I/O Expansion Unit Configurations

The External I/O Expansion Unit is available with one or two I/O boats. Two types of link kits (copper conductor and optical fiber) are also available.

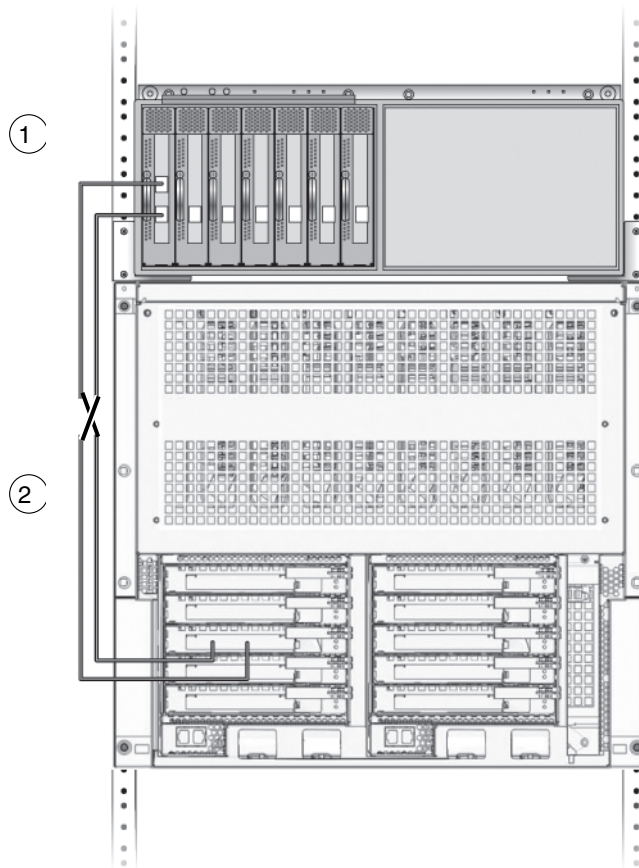
### 1.4.1 Single Boat Configuration

The base configuration for an External I/O Expansion Unit has a single boat, with a filler panel in the second boat bay. [FIGURE 1-24](#) shows a host server and a base External I/O Expansion Unit in the same cabinet.

A link card in the host server connects to a link card in the External I/O Expansion Unit. Link cables connect the two link cards. (The cables are not shown to scale.)

The copper link kit includes a 13 ft. (4 meter) cable.

The optical link kit includes 33 ft. (10 meter) link cables so that an I/O box can be located at a place remote from host server. An 80 ft. (25 meter) optical cable is optional.



**FIGURE 1-24** Optical Cables Connect TX Sockets to RX Sockets

Item	Description
1	External I/O Expansion Unit
2	Host server

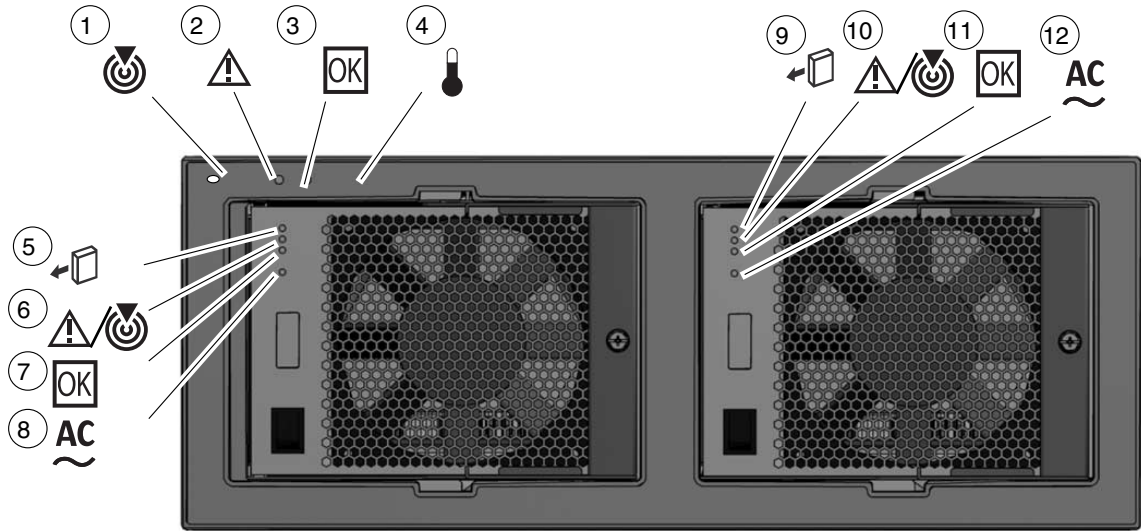
## 1.4.2 Dual Boat Configuration

The dual boat configuration provides twelve I/O slots. Each of the I/O boats requires its own link kit, so the host server must have two I/O slots available for this purpose.

## 1.5 LEDs

LEDs are located on the front (FIGURE 1-25) and rear (FIGURE 1-26) of the chassis and on individual PSUs and I/O boats.

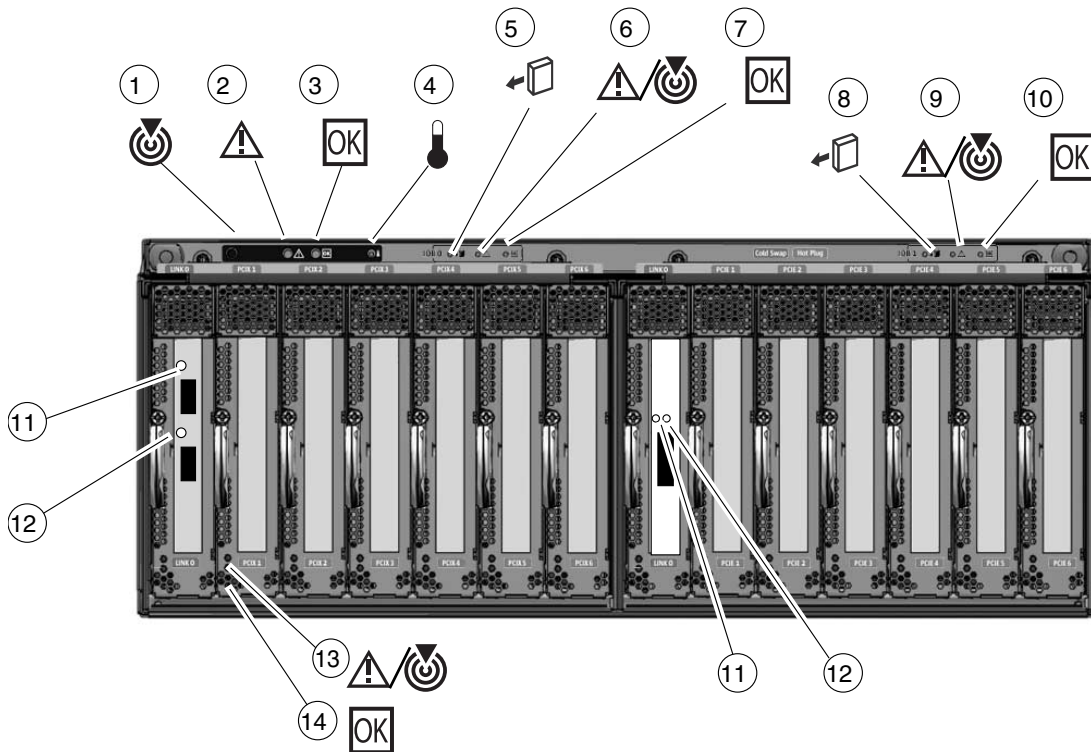
See [Appendix B](#) for information about interpreting LED states.



**FIGURE 1-25** LEDs on the Front of the Chassis

Item	LED Description	Item	LED Description
1	Chassis locate (LED and switch)	7	PSU0 DC power
2	Chassis fault/service required	8	PSU0 AC power
3	Chassis power	9	PSU1 ready to remove
4	Chassis overtemp	10	PSU1 fault/locate
5	PSU0 ready to remove	11	PSU1 DC power
6	PSU0 fault/locate	12	PSU1 AC power

**Note** – The Locate LED is a lighted push-button switch. When the flashing of its LED has helped you to locate the External I/O Expansion Unit, turn off the LED by pressing the switch. Note that the LED does not turn off if you press less than 0.5 seconds. You can also manually turn on the LED by pressing the button.



**FIGURE 1-26** LEDs on the Rear of the Chassis

Item	LED Description	Item	LED Description
1	Chassis locate (LED and switch)	8	I/O boat 1 ready to remove
2	Chassis fault/service required	9	I/O boat 1 fault/locate
3	Chassis power	10	I/O boat 1 DC power
4	Chassis overtemp	11	Link card data
5	I/O boat 0 ready to remove	12	Link card management
6	I/O boat 0 fault/locate	13	Slot attention/locate (all PCI carriers)
7	I/O boat 0 DC power	14	Slot power (all PCI carriers)



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**Note** – On the optical link card, the LEDs for link card data and link card management are located next to the optical cable sockets. Although the LEDs are near the sockets, they do not have any direct relationship to the sockets and are not intended to indicate the activity of the optical cable sockets.

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## 1.6 System Management

The PSUs contain temperature sensors. The PSUs can shut down automatically if they detect an extreme temperature. The PSUs also have sensors for voltage and current levels.

Temperature sensors are also located inside the I/O boats. FRU ID circuits are located on the PSUs, the I/O boats, and on the chassis centerplane. Temperature data and FRU ID information is available on an I<sup>2</sup>C bus (Inter-IC bus) in the External I/O Expansion Unit and the link cards.

The service processor in the host system can monitor the I<sup>2</sup>C bus in the External I/O Expansion Unit. The service processor can power down the External I/O Expansion Unit if parameters exceed maximum limits.

There is no service processor in the External I/O Expansion Unit itself.

The `ioxadm` command is available on the host system to display External I/O Expansion Unit sensor information and LED states. You can also use `ioxadm` to control the Locate LEDs in the External I/O Expansion Unit and to power on or off FRUs in the External I/O Expansion Unit. Refer to the `ioxadm` (8) man page for more information.

For examples of software commands, see [Appendix C](#).

---

## 1.7 Site Preparation

The following information summarizes installation requirements for the External I/O Expansion Unit.

For additional specifications and compliance information, see [Appendix A](#).

## 1.7.1 Physical Requirements

- The External I/O Expansion Unit with the cable management unit attached is 19 in. (480 mm) wide and 39.4 in. (1000 mm) deep.
- The movement of air through the External I/O Expansion Unit chassis is from front to back.
- The External I/O Expansion Unit is four rack units tall (7.0 inches/178 mm).
- Service access to the External I/O Expansion Unit is from the front or rear. The mounting rails do not slide.
- The choice of mounting location in a rack or cabinet can be limited by the length of the link cable:
  - The optical link kit includes a 33-foot/10-meter cable. The External I/O Expansion Unit can be located some distance from the host server cabinet.
  - An 80-foot/25-meter optical link cable is optional.
  - The copper link kit includes a 13-foot/4-meter cable.
- The maximum weight of the External I/O Expansion Unit is approximately 81 pounds (36.8 kg).



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**Caution** – Mount the heaviest subassemblies at the lowest available opening to minimize the precarious effects of a top-heavy system.

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**Note** – Do not install another product between two External I/O Expansion Units if the product is short in height and shorter in depth than the External I/O Expansion Units. If there is little space between the upper and lower External I/O Expansion Units, there may not be enough space for your hands and arms to connect cables on the rear of the product.

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## 1.7.2 Electrical Requirements

- The maximum wattage per PCI card is 25 watts.
- Two AC cords (supplied) must be used with the internal AC cables ([FIGURE 1-2](#)).
- The supply voltage is 100 VAC to 240 VAC, 50-60 Hz.
- The maximum power rating of External I/O Expansion Unit is 600 watts.

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## 1.8 Service Information

Service and installation information is also available on service labels that are located on the External I/O Expansion Unit top cover and on the dummy cards that are shipped with new carriers.

**TABLE 1-3** Service Information Summary

Topic	Comments
Access	<ul style="list-style-type: none"><li>• Service access to the External I/O Expansion Unit is from the front or rear of the unit.</li><li>• The top cover is removable.</li></ul>
Air flow	<ul style="list-style-type: none"><li>• Air flow in the External I/O Expansion Unit is from front to back.</li><li>• Fans are located in the power supply units. There are no separate fans or fan trays.</li><li>• The PSU and I/O boat slots have pivoting metal flaps that drop down to close the slots when a PSU or I/O boat is removed. This prevents the loss of cooling air.</li></ul>
Mounting brackets	The External I/O Expansion Unit is mounted on fixed brackets. Sliding rails are not available for this product.
PCI card installation	<ul style="list-style-type: none"><li>• To avoid overheating of the External I/O Expansion Unit, cards should be installed as quickly as possible.</li><li>• To prepare yourself to install a card within one or two minutes, see <a href="#">Section 1.3, “Carriers” on page 1-17</a>.</li></ul>
PCI cable removal	<ul style="list-style-type: none"><li>• When removing cables such as LAN cables, if you have difficulty unlatching the connector, press the latch with a flathead screwdriver to remove the cable.</li></ul>

**TABLE 1-3** Service Information Summary (*Continued*)

Topic	Comments
AC cables and cords	<ul style="list-style-type: none"><li>• The internal AC cables (FIGURE 1-2) are not removable. If they are damaged, replace the chassis.</li><li>• Each internal AC cable connects to only one PSU. Connect both AC cables to AC power to ensure that both PSUs are operational.</li><li>• The internal AC cables are not connected directly to AC voltage. Use the AC power cords to connect the internal AC cables to AC voltage.</li><li>• Do not use AC cables designed for other products with the External I/O Expansion Unit.</li></ul>
Link cables	<ul style="list-style-type: none"><li>• The optical version of the link kit includes two unidirectional cables. The ends of the cables are marked TX and RX (transmit and receive, respectively).</li><li>• The copper link kit has one cable. The connector is designed in a way that it cannot be connected upside down.</li></ul>
Jumpers	<ul style="list-style-type: none"><li>• The External I/O Expansion Unit does not have jumper pins.</li><li>• For information about any jumper pins that might be present on a specific PCI card, see the instructions that came with the card.</li></ul>

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## 1.9

# Electrostatic Discharge Precautions



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**Caution** – Circuit board components are vulnerable to damage by electrostatic discharge (ESD). An electrostatic charge can build up on the human body and then discharge when you touch a board. Such discharge can be produced by walking across a carpet and touching a board, or by other similar cause. Before handling any board, make sure you dissipate your body's charge. Touch a conductive surface of the chassis or other element connected to common earth ground to discharge the static electricity present in your body. To minimize risk of ESD damage

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- Handle board by edges only
- Store board in antistatic bag provide
- Use a grounding strap and an ESD mat whenever you work on a board.



# Installing the External I/O Expansion Unit in a Cabinet

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The following topics are in this chapter:

- Section 2.1, “Tools” on page 2-1
- Section 2.2, “Installing the Rails in a Type S Rack” on page 2-2
- Section 2.3, “Installing the Rails in a Type F Rack and the SPARC Enterprise 8000 Server” on page 2-7
- Section 2.4, “Installing the External I/O Expansion Unit in the Cabinet” on page 2-13
- Section 2.5, “Installing the Cable Management Unit” on page 2-14
- Section 2.6, “Installing the AC Cords” on page 2-17
- Section 2.7, “Installing the Link Kit” on page 2-20
- Section 2.7.1, “Installing the Optical Link Kit” on page 2-20
- Section 2.7.2, “Installing the Copper Link Kit” on page 2-21

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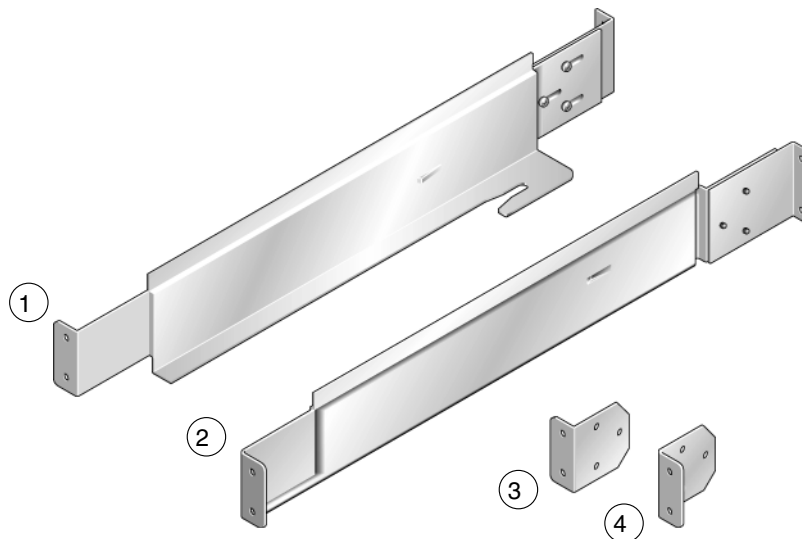
## 2.1 Tools

You need the following tools for this installation:

- Phillips No. 2 screwdriver
- Phillips No. 1 screwdriver
- ESD-protected mat and a grounding strap
- (Suggested) digital voltmeter to verify correct grounding

## 2.2 Installing the Rails in a Type S Rack

The External I/O Expansion Unit mounting kit (FIGURE 2-1) includes a right-side mounting rail and a left-side mounting rail. The mounting rails are shipped assembled. The mounting kit includes two chassis lock brackets and an assortment of screws and caged nuts.



**FIGURE 2-1** Mounting Kit

Item	Description
1	Left mounting bracket
2	Right mounting bracket
3	Left chassis lock bracket
4	Right chassis lock bracket

1. Use an antistatic strap for this procedure.
2. Locate a suitable mounting location in the cabinet.
  - The External I/O Expansion Unit occupies a height of four rack units (7 in./178 mm).
  - Mount the heaviest subassemblies at the lowest available opening to minimize the precarious effects of a top-heavy system.

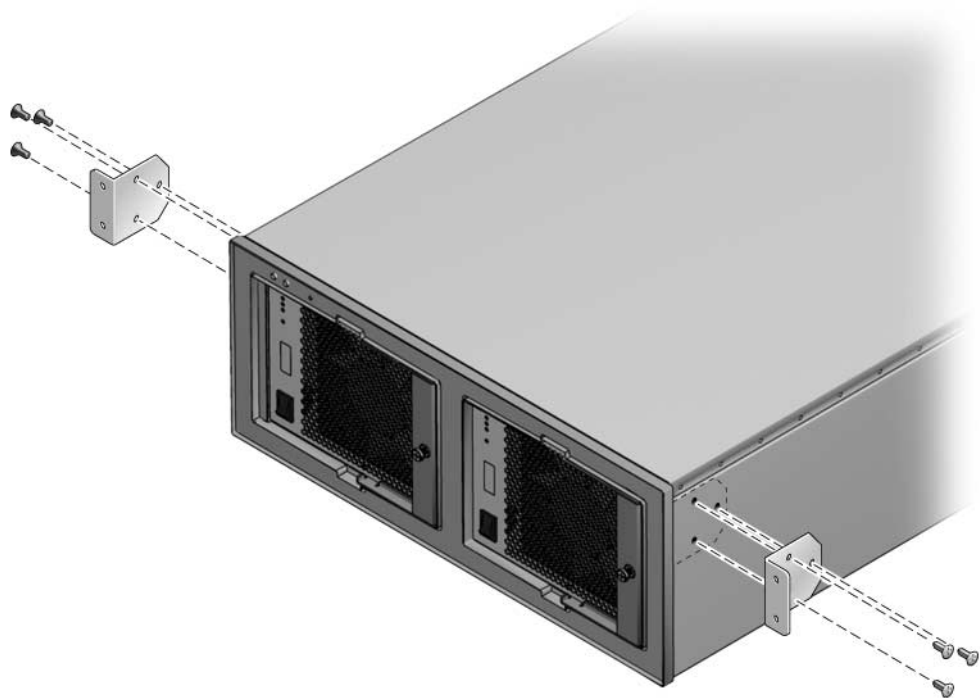


- If you are installing more than one External I/O Expansion Unit, install them together. Do not install a shorter subassembly between External I/O Expansion Unit where the rear of the shorter subassembly might difficult to reach.
- If the cabinet is marked with rack units, place the mounting rail so that the lower screw hole on the rail is one hole above a RU mark ([FIGURE 2-2](#)). This aligns the mounting rail with the lower RU mark.



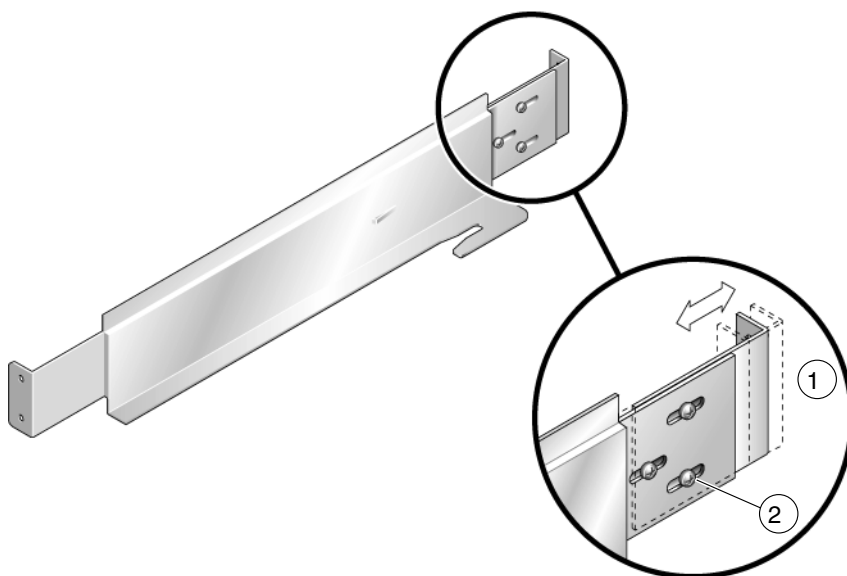
**FIGURE 2-2** Typical Rack Unit Marks

3. Using no. 2 Phillips screws, attach the chassis lock brackets to the sides of the External I/O Expansion Unit ([FIGURE 2-3](#)).



**FIGURE 2-3** Installing the Chassis Lock Brackets

4. Loosen the screws (FIGURE 2-4) that hold the sliding flanges to the mounting rails. This action allows the rear flanges to adjust to fit different rack depths.



**FIGURE 2-4** Sliding Flange

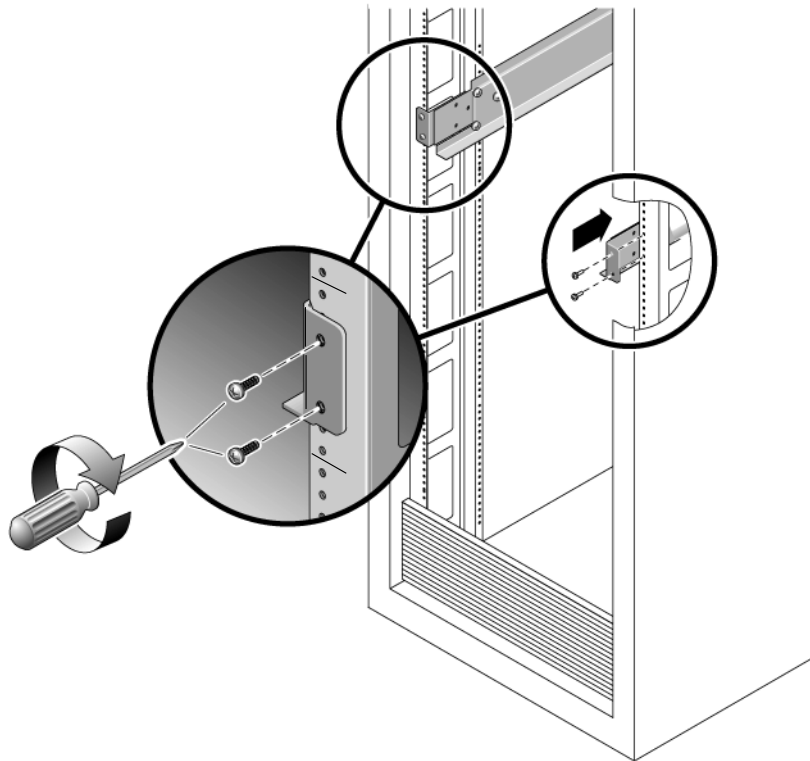
Item	Description
1	Sliding flange
2	Flange crews

5. Attach the mounting rails to the cabinet ([FIGURE 2-5](#)):
  - a. At the front of the cabinet, orient the hooked portion of the mounting rail away from you.
  - b. Loosely attach the front of the mounting rail to the cabinet. (Install and tighten the screws, then loosen each screw approximately one-half turn.)
  - c. Repeat [Step a](#) and [Step b](#) for the second mounting rail.
  - d. At the rear of the cabinet, slide the end of each mounting rail to fit the depth of the cabinet.
  - e. Loosely attach the rear ends of the mounting rails to the cabinet.
  - f. Narrow the space between the rear ends of the mounting rails by sliding the ends of the rails toward each other.

---

**Note** – At the front of the cabinet, the space between the rails should be equal to or slightly wider than the width of the External I/O Expansion Unit chassis. At the rear of the cabinet, the space between the rails should be slightly narrower than the width of the External I/O Expansion Unit chassis. This arrangement allows the correct fitting of the rails to the sides of the External I/O Expansion Unit. See [Section 2.4, “Installing the External I/O Expansion Unit in the Cabinet”](#) on page 2-13.

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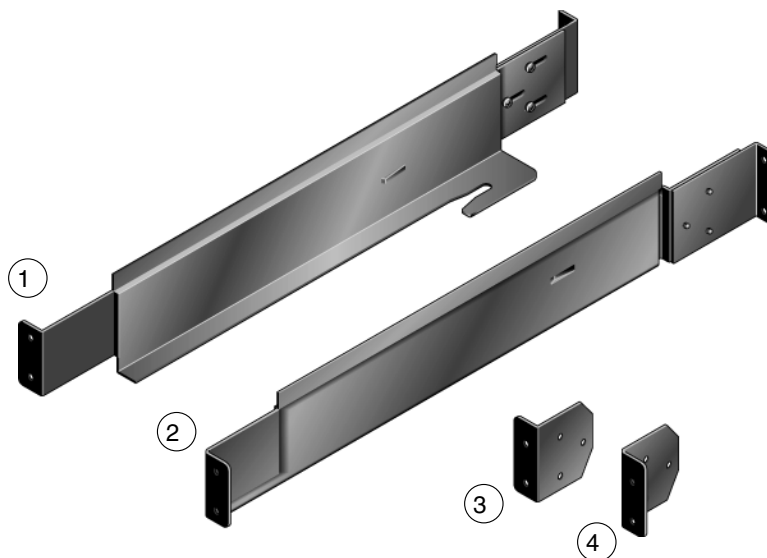


**FIGURE 2-5** Installing the Mounting Brackets in a Cabinet

6. Tighten the screws at the front of the cabinet.
7. Verify that the rails at the rear of the cabinet can still slide slightly to the left and right.

## 2.3 Installing the Rails in a Type F Rack and the SPARC Enterprise 8000 Server

The External I/O Expansion Unit mounting kit (FIGURE 2-6) includes right-side and left-side mounting rails. The mounting rails are shipped assembled. The mounting kit includes two chassis lock brackets and an assortment of screws and caged nuts.



**FIGURE 2-6** Mounting Kit

Item	Description
1	Left mounting bracket
2	Right mounting bracket
3	Left chassis lock bracket
4	Right chassis lock bracket

1. Use an antistatic strap for this procedure.
2. Locate a suitable mounting location in the rack or the cabinet.
  - The External I/O Expansion Unit occupies a height of four rack units (7 in./178 mm).

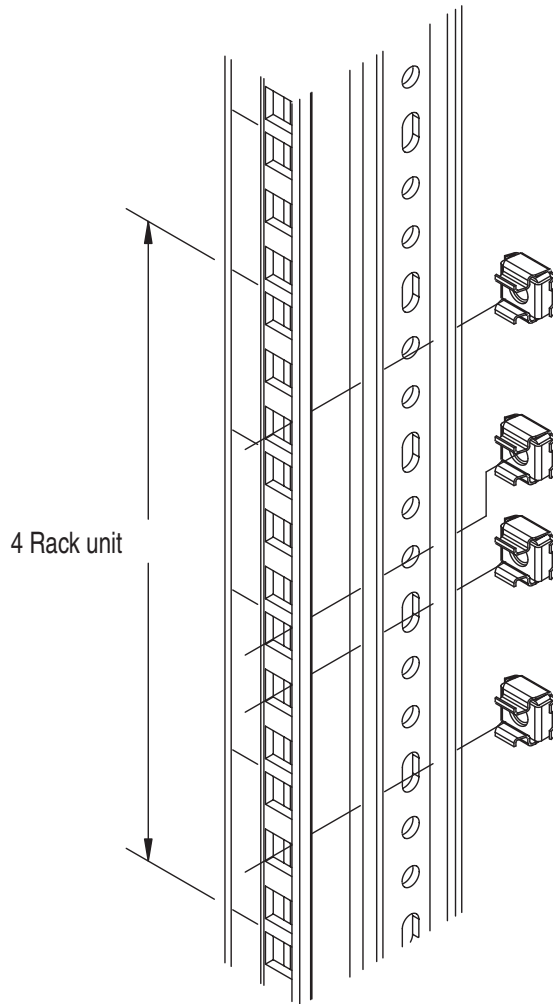
- For safety, mount the heaviest subassemblies at the lowest available opening to minimize the precarious effects of a top-heavy system.
- If you are installing more than one External I/O Expansion Unit, install them together. Do not install a shorter subassembly between External I/O Expansion Unit where the rear of the shorter subassembly might difficult to reach.

### 3. Install caged nuts in the rack pillars.

TABLE 2-1 lists the rack rail locations for the caged nuts.

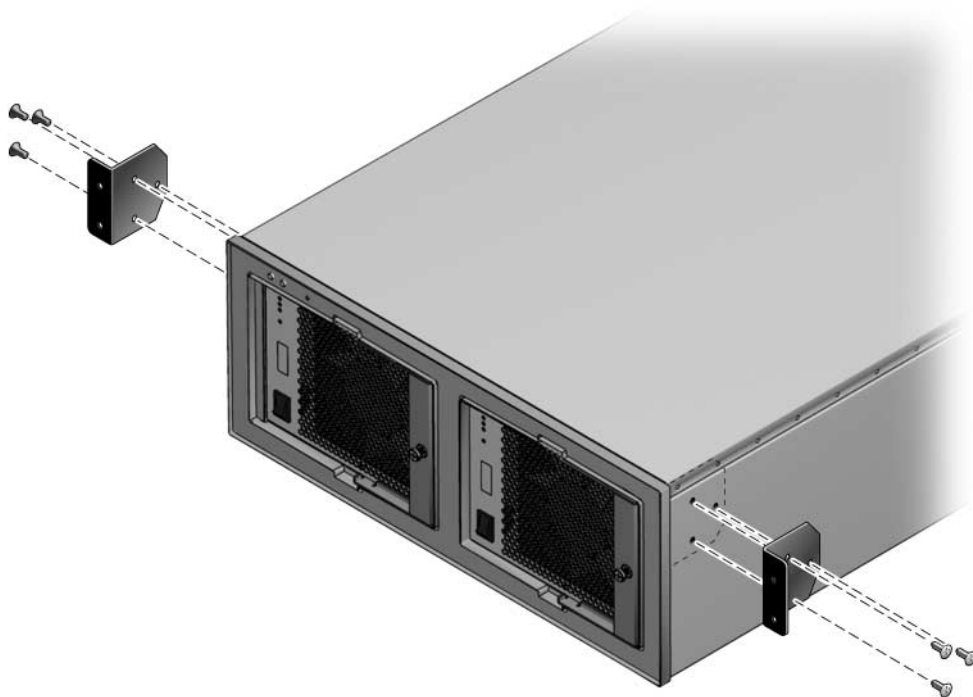
**TABLE 2-1** Caged Nut Locations

Rack Unit	Hole #	Front	Rear
4	12		
	11		
	10	Caged nut	Caged nut
3	9		
	8		
	7		
2	6	Caged nut	Caged nut
	5	Caged nut	Caged nut
	4		
1	3		
	2	Caged nut	Caged nut
	1		



**FIGURE 2-7** Typical Installation of Caged Nuts

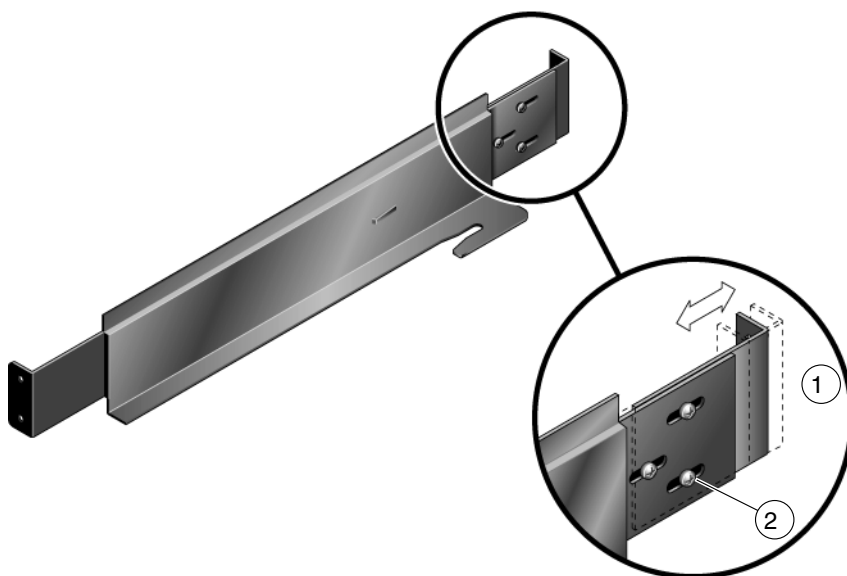
4. Using no. 2 Phillips screws, attach the chassis lock brackets to the sides of the External I/O Expansion Unit ([FIGURE 2-8](#)).



**FIGURE 2-8** Installing the Chassis Lock Brackets

5. Loosen the screws (FIGURE 2-9) that hold the sliding flanges to the mounting rails. This action allows the rear flanges to adjust to fit different rack depths.

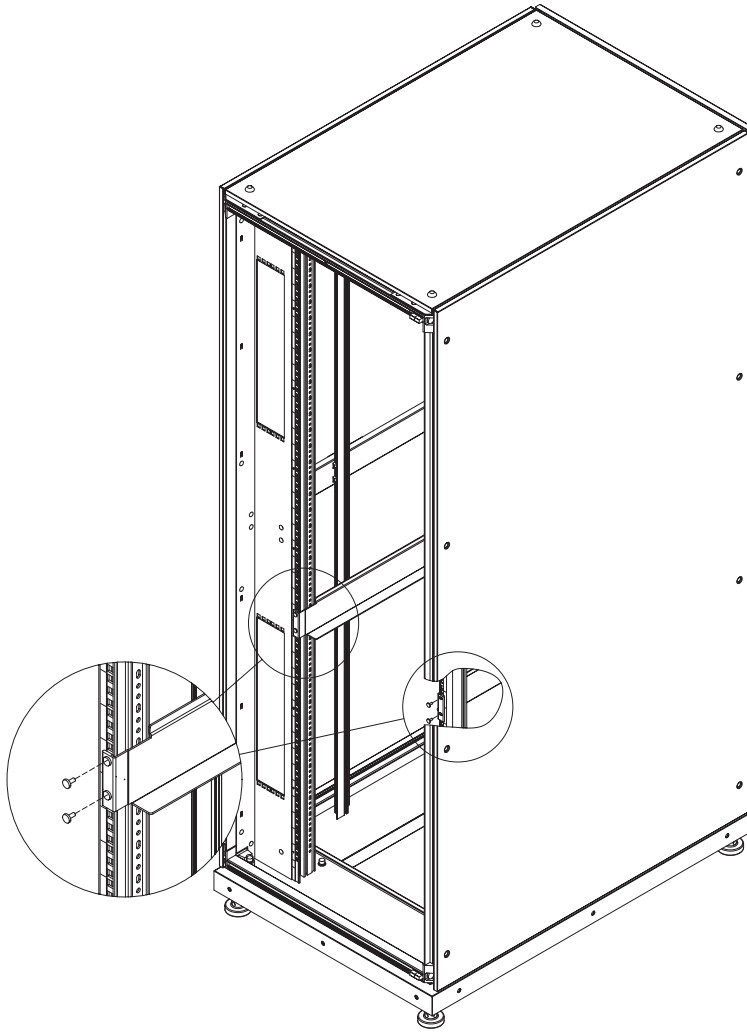




**FIGURE 2-9** Screws on the Sliding Flanges

Item	Description
1	Sliding flange
2	Flange crews

6. Attach the mounting rails to the rack ([FIGURE 2-10](#)):
  - a. At the front of the cabinet, orient the hooked portion of the mounting rail away from you.
  - b. Loosely attach the front of the mounting rail to the cabinet. (Install and tighten the screws, then loosen each screw approximately one-half turn.)
  - c. Repeat [Step a](#) and [Step b](#) for the second mounting rail.
  - d. At the rear of the cabinet, slide the end of each mounting rail to fit the depth of the cabinet.
  - e. Loosely attach the rear ends of the mounting rails to the cabinet.
  - f. Narrow the space between the rear ends of the mounting rails by sliding the ends of the rails toward each other.



**FIGURE 2-10** Mounting Bracket Installation

---

**Note** – At the front of the cabinet, the space between the rails should be equal to or slightly wider than the width of the External I/O Expansion Unit chassis. At the rear of the cabinet, the space between the rails should be slightly narrower than the width of the External I/O Expansion Unit chassis. This arrangement allows the correct fitting of the rails to the sides of the External I/O Expansion Unit. See [Section 2.4, “Installing the External I/O Expansion Unit in the Cabinet”](#) on [page 2-13](#).

---

7. Tighten the screws at the front of the cabinet.
8. Verify that the rails at the rear of the cabinet can still slide slightly to the left and right.

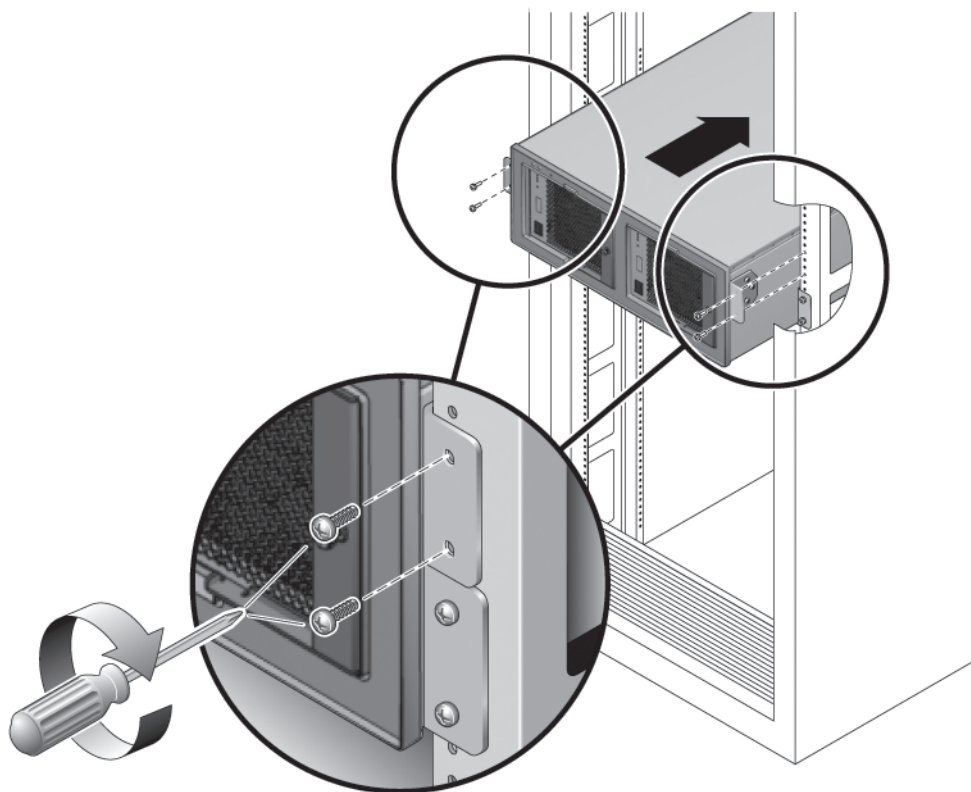
---

## 2.4 Installing the External I/O Expansion Unit in the Cabinet

1. Use an antistatic strap for this procedure.
2. Place the External I/O Expansion Unit on the front of the mounting rails and slide the External I/O Expansion Unit into the cabinet.

As you slide the External I/O Expansion Unit into the cabinet, the sides of the External I/O Expansion Unit chassis push the ends of the rails apart from each other. When the chassis is almost completely in the cabinet, bulges on the underside of the chassis contact hooks that are located on the mounting rails, wedging the mounting rails tightly against the sides of the chassis. This wedging action stabilizes the External I/O Expansion Unit and is necessary to reduce the amount of vibration that occurs when the system is running.

3. Tighten the screws at the rear of the mounting rails.
4. Lock the front of the External I/O Expansion Unit in place with two screws on each side (FIGURE 2-11).



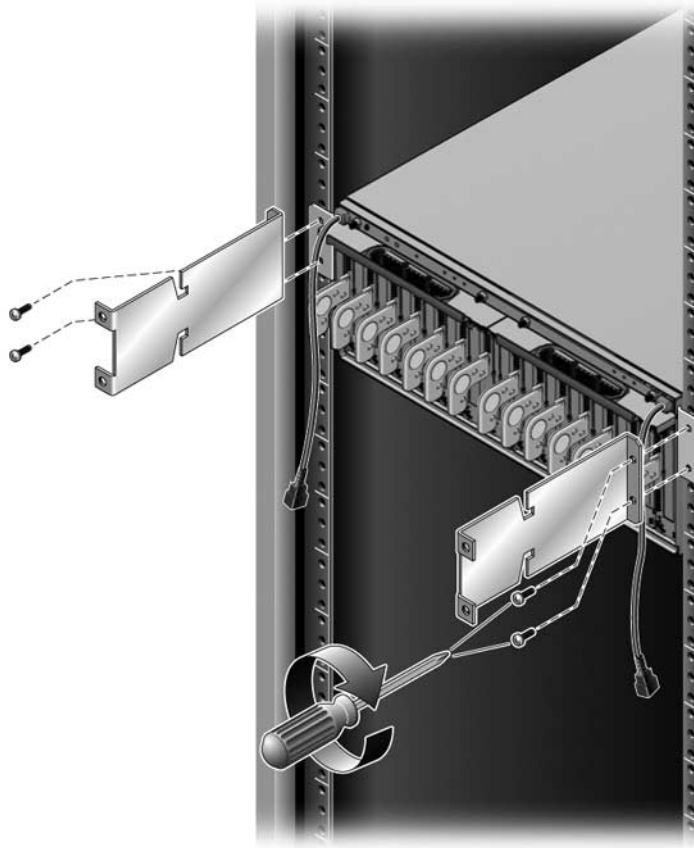
**FIGURE 2-11** Installing the External I/O Expansion Unit in the Rack

---

## 2.5 Installing the Cable Management Unit

At the rear of the cabinet, install the cable management support brackets:

1. Use an antistatic strap for this procedure.
2. Place the support brackets just above the chassis mounting brackets ([FIGURE 2-12](#)) and loosely attach the support brackets to the cabinet with two screws each. Do not tighten the screws yet.



**FIGURE 2-12** Installing the Support Brackets

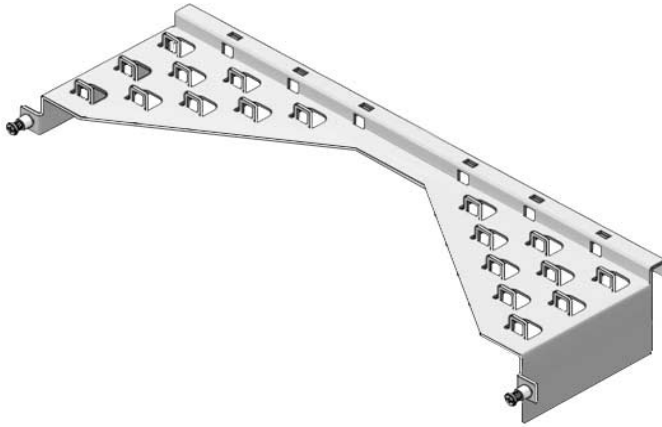
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**Note** – The cable management unit includes one Type A cable plate ([FIGURE 2-13](#)). Some configurations also include a type B cable plate ([FIGURE 2-14](#)).

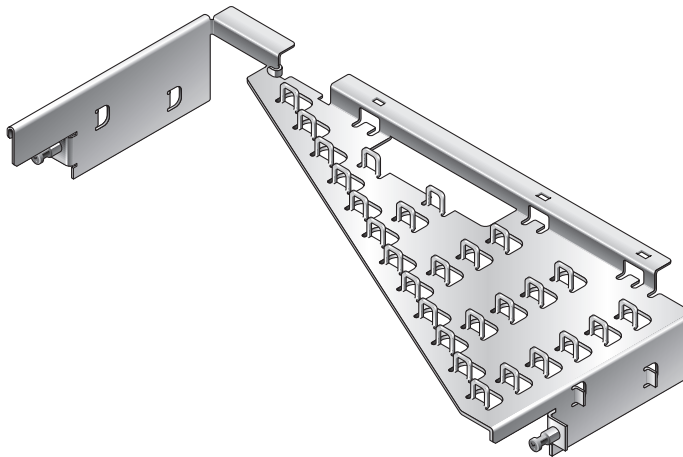
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**3. Place the cable plate between the support brackets ([FIGURE 2-15](#)).**

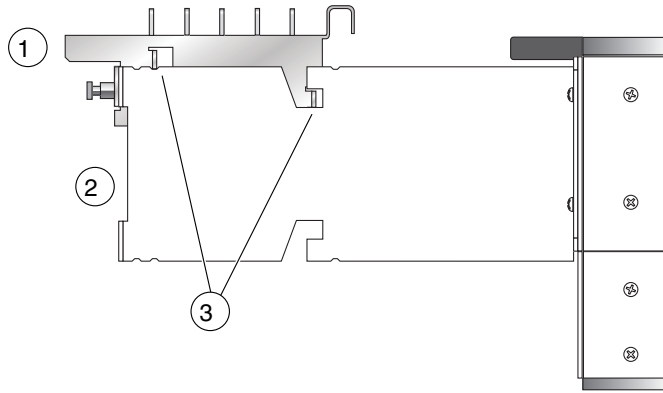
On each side of the cable plate, the forward tab rests on the bottom of the large cutout in the support bracket. The rear tab rests in a small depression in the top of the support bracket. This is the normal operating position for the cable plate.



**FIGURE 2-13** Type A Cable Plate, Top View



**FIGURE 2-14** Type B Cable Plate, Top View



**FIGURE 2-15** Cable Plate and Support Bracket, Side View

Item	Description
1	Cable plate
2	Support bracket
3	Supporting tabs on the cable plate

4. Tighten the green cable plate locking screws at each side of the cable plate.
5. Tighten the mounting screws on the support brackets.

## 2.6 Installing the AC Cords

1. Use an antistatic strap for this procedure.
2. Attach an AC cord to an internal AC cable at the rear of the External I/O Expansion Unit, then connect the AC cord to an AC outlet.

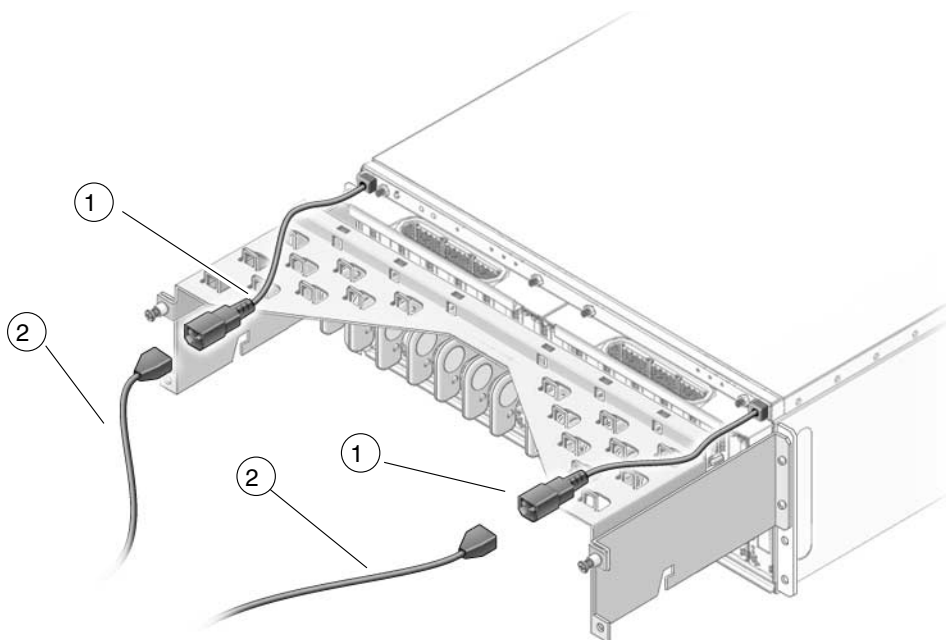
**Note** – Do not attempt to connect the internal AC cable directly to an AC socket (power distribution unit or power strip). You must use one of the AC cords supplied with the External I/O Expansion Unit.

3. Attach an AC cord to the remaining internal AC cable as in [Step 2](#).

---

**Note** – The fan might turn on when you insert a power supply into the External I/O Expansion Unit. This is normal behavior if you are replacing a PSU while the other PSU is powered up.

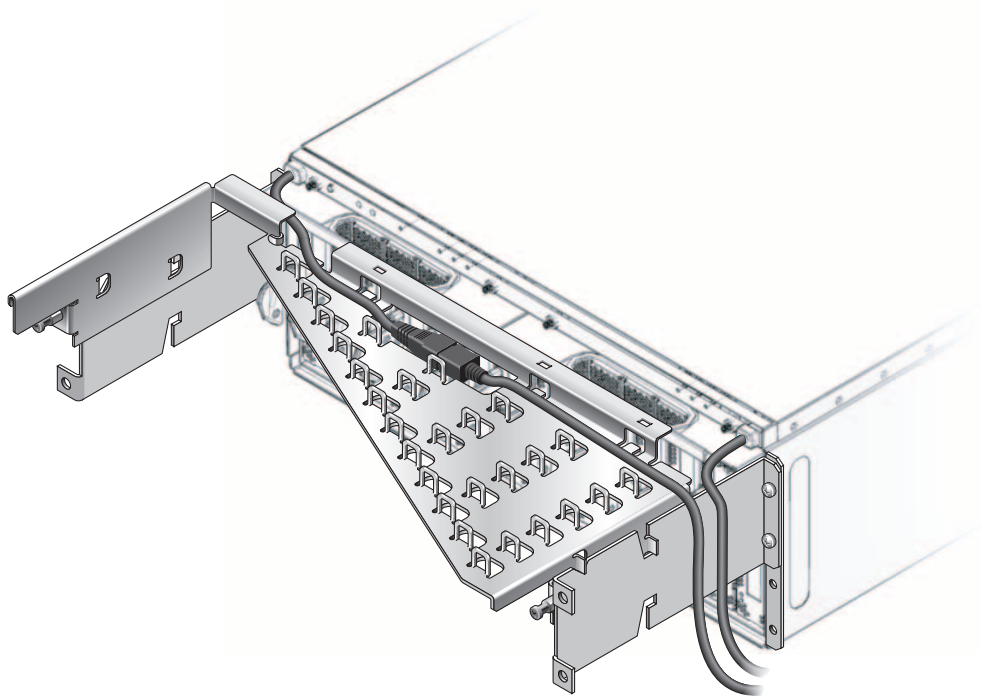
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**FIGURE 2-16** AC Cables for Type A Cable Management Plate

Item	Description
1	Internal AC cables
2	AC cords







**FIGURE 2-17** AC Cables and Cords for Type B Cable Management Plate

**4. Turn on the PSU AC switches.**

The switches are located on the front of the power supplies.  
 The LEDs on the power supplies should display the following indications after a short initialization period.

**TABLE 2-2** Normal PSU Indications

LED	Indication
 AC Power	On (green LED)
 DC Power	On (green LED)

For other LED combinations, see [TABLE B-4](#).

**5. Turn off the PSU AC switches.**

The LEDs on the PSUs continue glowing until DC current in the PSUs is depleted. This can take approximately five to ten seconds.

---

## 2.7 Installing the Link Kit

A link kit includes two identical link cards, one for the host server and one for the I/O boat. You can install either card in either location.

The link card in the I/O boat is always installed in boat slot 0. If your External I/O Expansion Unit has two I/O boats, then link cards must be located in slot 0 of both boats.

Your link kit is one of two types:

- Optical circuitry and two cables — see [Section 2.7.1, “Installing the Optical Link Kit” on page 2-20](#)
- Copper conductor circuitry and one cable — see [Section 2.7.2, “Installing the Copper Link Kit” on page 2-21](#)

### 2.7.1 Installing the Optical Link Kit

---

**Note** – The minimum bend radius for optical fiber link cables is 1.8 in. (46 mm).

---

**1. Use an antistatic strap for this procedure.**

**2. Install a link card in the host server.**

See the service manual for your host server for instructions for installing an PCI card.

**3. If a link card is not already installed in the I/O boat, install it now.**

**a. Remove the carrier in slot 0 of the I/O boat.**

Slot 0 is the leftmost slot in the boat. For details about card removal and replacement, see [Section 3.1, “Installing a PCI Card” on page 3-1](#).

**b. Remove the dummy card from the carrier.**

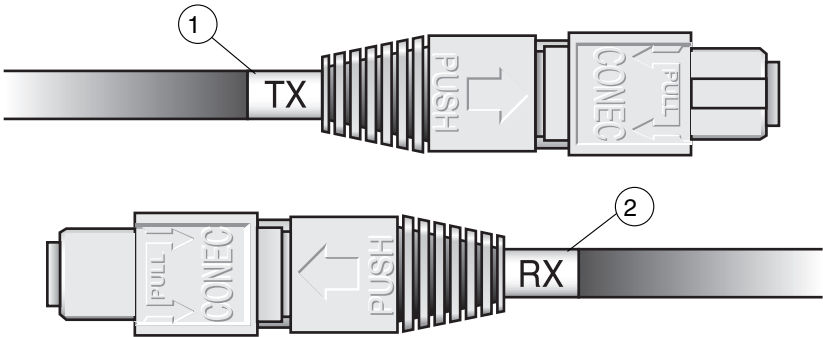
**c. Install the link card in the carrier.**

**d. Install the carrier and link card in slot 0.**

**4. Install the link cables.**

**Note** – The two optical link cables are identical. One end of a cable is marked TX. The other end is marked RX (FIGURE 2-18). When you route the cables, ensure that the TX plug of one cable is paired with the RX plug of the other cable.

- a. At the I/O boat, connect a plug marked TX into the TX port on the link card. Connect the RX plug of the second cable into the RX port.
- b. At the host server, connect a plug marked TX to the TX port on the link card. Connect the RX plug of the remaining cable into the RX port.



**FIGURE 2-18** TX and RX Labels on the Optical Link Cable

Item	Description
1	TX label
2	RX label

**Note** – Check the labels to verify that each plug is connected to the correct port. The TX and RX plugs are identically shaped, so it is easy to incorrectly connect a plug to the wrong port.

## 2.7.2 Installing the Copper Link Kit

**Note** – The minimum bend radius for the copper link cable is 1.85 in. (47 mm).

- 1. Use an antistatic strap for this procedure.

**2. Install a link card in the host server.**

See the service manual for your host server for instructions for installing an PCI card.

**3. If a link card is not already installed in the I/O boat, install it now.**

**a. Remove the carrier in slot 0 of the I/O boat.**

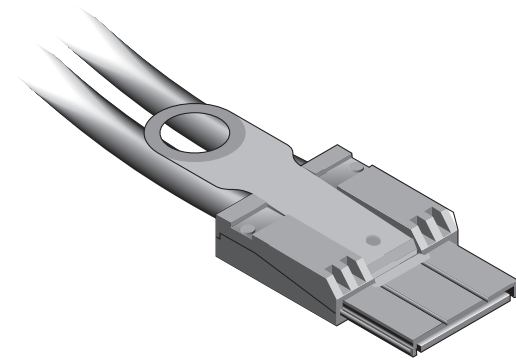
Slot 0 is the leftmost slot in the boat. For details about card removal and replacement, see [Section 3.1, "Installing a PCI Card" on page 3-1](#).

**b. Remove the dummy card from the carrier.**

**c. Install the link card in the carrier.**

**d. Install the carrier and link card in slot 0.**

**4. Connect the link cable to both link cards.**



**FIGURE 2-19** Copper Link Cable Plug

---

**Note** – If it is necessary to disconnect a link cable, pull the ring-shaped tab approximately 0.15 inch (2mm) in the direction shown by the arrow in [FIGURE 2-20](#).

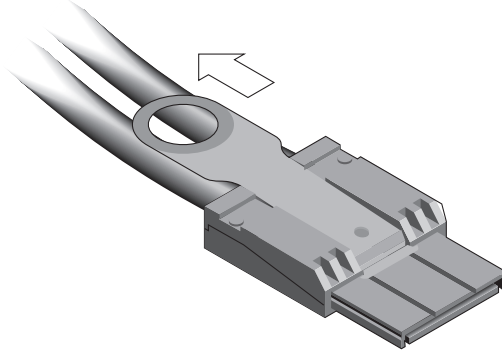
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**Caution** – Do not pull the ring tab more than 0.15 inch (2mm), or it will break. When disconnecting the cable from a link card, pull the cable plug while pulling carefully on the ring tab.

---



**FIGURE 2-20** Copper Link Cable Ring Tab



# Working with PCI Cards

---

This chapter gives procedures for installing PCI and link cards, and related cables.

- [Section 3.1, “Installing a PCI Card” on page 3-1](#)
- [Section 3.2, “Replacing a PCI Card” on page 3-8](#)
- [Section 3.3, “Installing Cables for PCI Cards” on page 3-14](#)

---

## 3.1 Installing a PCI Card

1. **Determine which card locks you will use to mount your PCI card on a carrier.**

The size and shape of the PCI card affect the quantity and type of card locks you use. Before you start this procedure, you must decide which locks you will use for the PCI card. See [Section 1.3.2, “Card Locks” on page 1-20](#)

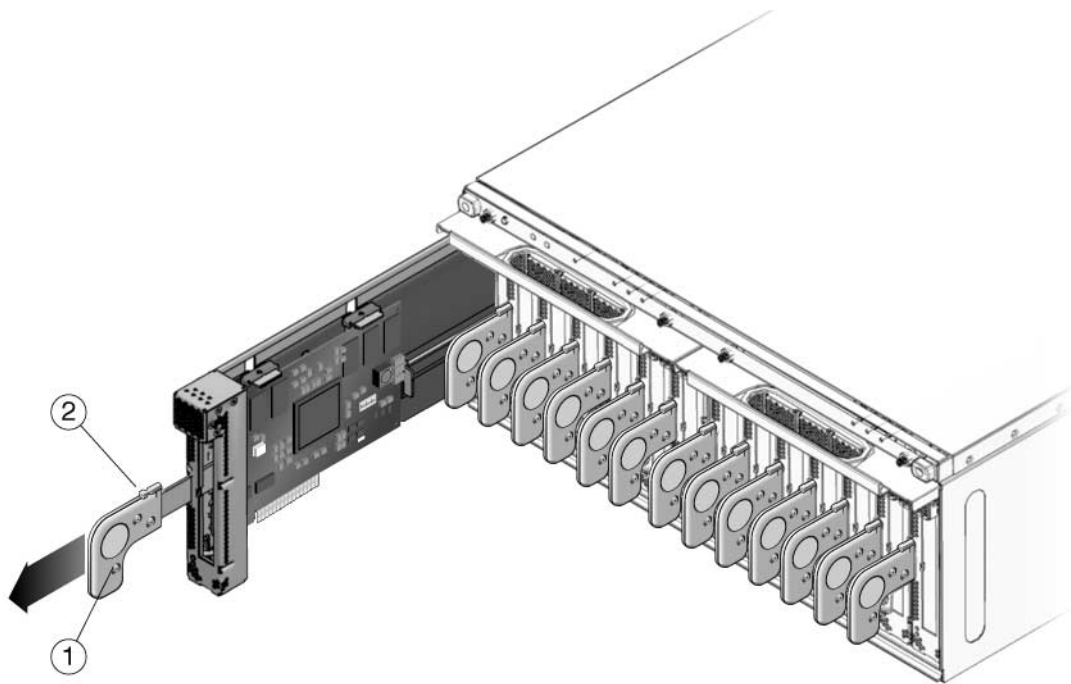


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**Caution** – If you install a PCI card while the External I/O Expansion Unit is running, be prepared to complete the installation in approximately two minutes. If you leave a carrier slot empty for too long, the External I/O Expansion Unit might overheat.

---

2. **Use an antistatic strap for this procedure.**
3. **Unscrew the retaining screw on the carrier handle (item 1 in [FIGURE 3-1](#)), then pull out the carrier handle approximately four inches (100 mm).**



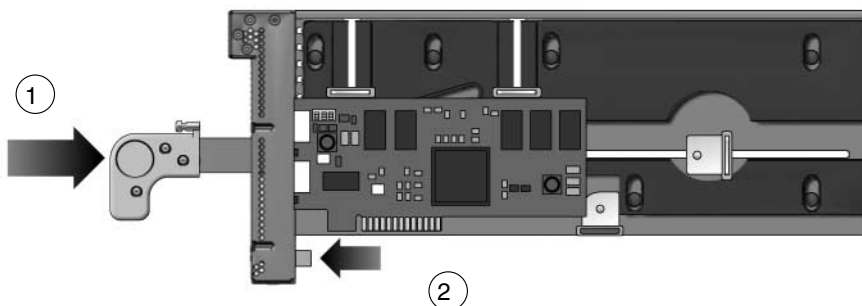
**FIGURE 3-1** Unlocking and Removing a Carrier

Item	Description
1	Carrier handle
2	Carrier locking screw

4. Pull the carrier out of the slot and place it on an antistatic work surface.
5. Press the locking latch ([FIGURE 3-2](#)) while you push the carrier handle into the closed position.

This action lowers the carrier plate, giving you room to move the PCI card into place on the carrier.

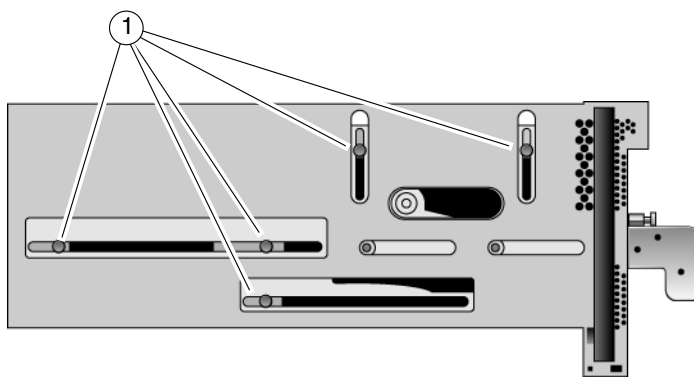




**FIGURE 3-2** Closing the Carrier Handle

Item	Description
1	Push carrier handle to the right
2	Push locking latch to the left

6. Place the carrier on a padded static-safe surface and loosen the card lock screws. The screws are on the back of the carrier ([FIGURE 3-3](#)).



**FIGURE 3-3** Screws for Card Locks

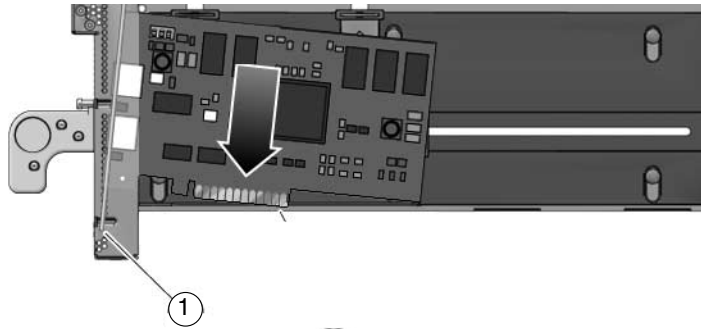
Item	Description
1	Card lock screws

7. Turn the carrier over and remove the dummy card or PCI card.
8. For very small PCI cards (1.25 in./31 mm tall and/or 3.0 in./76 mm wide), it is necessary to do one or both of the following:

- Move the long card lock from the horizontal slider slot to the front vertical slider slot, then slide it down to reach the top of the PCI card.
- Rotate the fourth card lock 270 degrees counterclockwise from its parking position and slide it to the rear edge of the PCI card.

9. Place the PCI card on the carrier.

- a. Place the front of the card inside the housing (FIGURE 3-4).



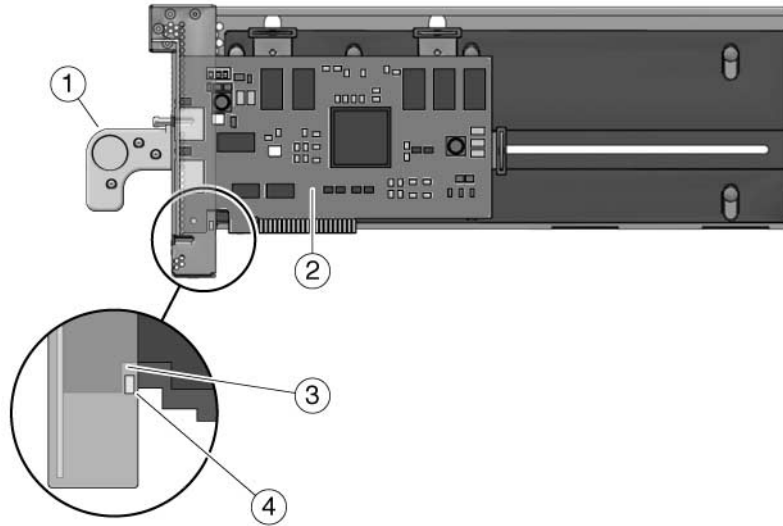
**FIGURE 3-4** Inserting the PCI Card

Item	Description
1	See the caution, below.



**Caution** – Do not allow the bottom edge of the PCI card bracket to tear the RFI gasket in the front of the carrier (FIGURE 3-4).

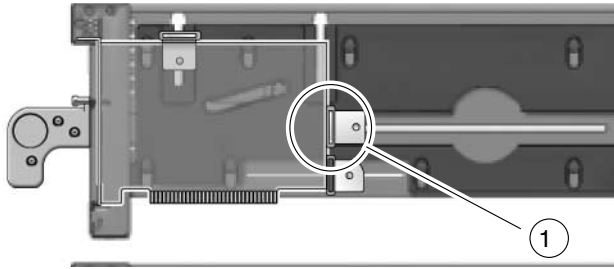
- b. Hook the notch (item 3 in FIGURE 3-5) on the bottom front of the card over the locator bar (item 4 in FIGURE 3-5). The locator bar is part of the bottom left corner of the carrier plate.



**FIGURE 3-5** Hooking the Card Notch Over the Locator Bar

Item	Description
1	Carrier locking handle (in closed position)
2	PCI card
3	Notch on bottom of PCI card
4	Detail of locator bar on the moveable plate

10. **Attach the PCI card to the carrier with one card lock:**
  - a. Slide a card lock to the right edge of the PCI card.
  - b. Hold the card in place and partially tighten the card lock screw.
  - c. Verify that the PCI card is not tilted, then tighten the card lock screw.



**FIGURE 3-6** Using Card Lock to Hold the PCI Card

Item	Description
1	Card lock

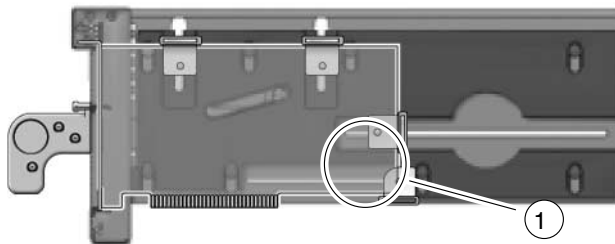
**11. Slide the remaining card locks to the edges of the PCI card and tighten the screws.**

The shape of a PCI card might prevent the use of some card locks. The minimum requirement is one card lock on the side of the PCI card and one card lock on the top.

**Note** – If the card lock screws are loose, the card locks will slip. The PCI card will not seat properly.



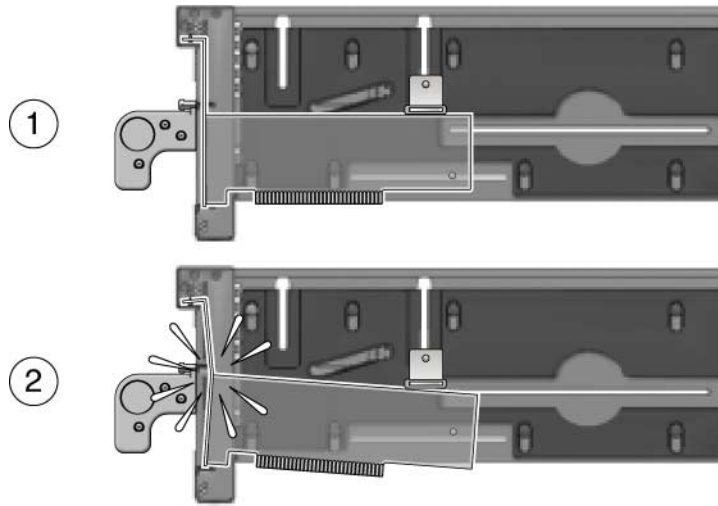
**Caution** – If the bottom card lock (Type C) is not used, leave it at the far right side of the slot ([FIGURE 3-7](#)). The PCI card will not seat properly if the bottom of the card lock touches the card socket.



**FIGURE 3-7** Correct Location for an Unused Type C Card Lock



**Caution** – Do not apply excessive pressure on the upper card locks. Too much pressure will bend the PCI card bracket. See [FIGURE 3-8](#).



**FIGURE 3-8** Excessive Pressure Bends the PCI Card Bracket

Item	Description
1	Moderate pressure on an upper card lock holds the PCI card in a horizontal position.
2	Excessive pressure bends the PCI card bracket

**12. Pull the carrier handle into the fully open position to raise the carrier plate.**

If the carrier plate is not completely raised, the bottom edge will hit the card socket in the I/O boat in [Step 13](#) and [Step 14](#).

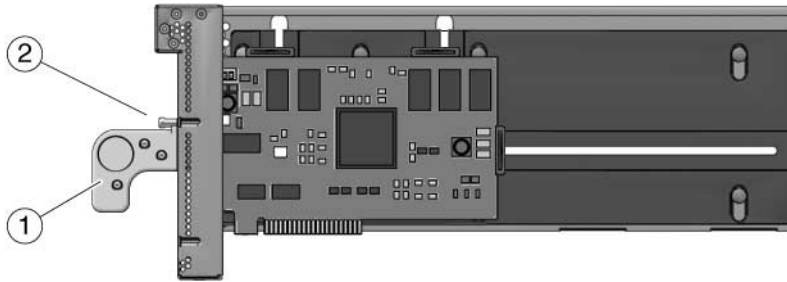
**13. Carefully place the replacement carrier in the card guides at the top and bottom of the carrier slot in the I/O boat.**

**14. Push the carrier fully into the carrier slot, then push the carrier handle into the closed position ([FIGURE 3-9](#)).**

This action seats the PCI card in the card socket.



**Caution** – If the carrier handle does not close easily, the PCI card might not be seating properly in the card socket in the I/O boat. Remove the carrier and inspect the PCI card. If the bottom of the PCI card is not perfectly horizontal, loosen the card locks and realign the card on the carrier. For troubleshooting information, see [Appendix D](#)



**FIGURE 3-9** PCI Card and Carrier

Item	Description
1	Carrier handle (in closed position)
2	Carrier locking screw

15. Use the carrier locking screw located on the top of the handle to lock the carrier handle in place.

16. Add the PCI card to a Solaris domain.

For details, refer to the service manual for your host server.

## 3.2 Replacing a PCI Card



**Caution** – If you install a PCI card while the External I/O Expansion Unit is running, be prepared to complete the installation in approximately two minutes. If you leave a carrier slot empty for too long, the External I/O Expansion Unit might overheat.

1. Use an antistatic strap for this procedure.

2. Remove the PCI card from the Solaris domain.

For details, refer to the service manual for your host server.

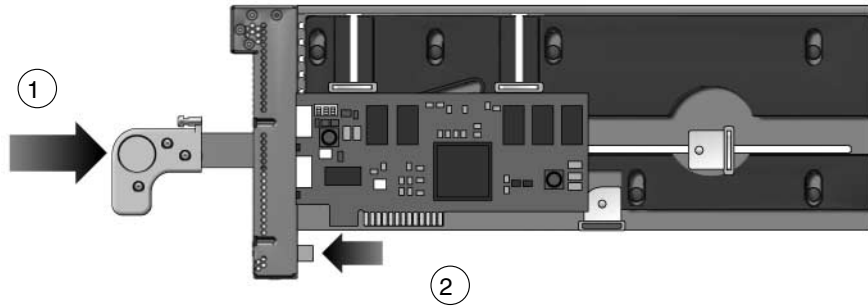
3. Remove the carrier from the carrier slot in the I/O boat.

a. Loosen the carrier locking screw on the carrier handle.

b. Pull the carrier handle out fully.

- c. Pull the carrier out of the carrier slot and place on an antistatic surface.
4. Press the locking latch (FIGURE 3-10) while you push the carrier handle into the closed position.

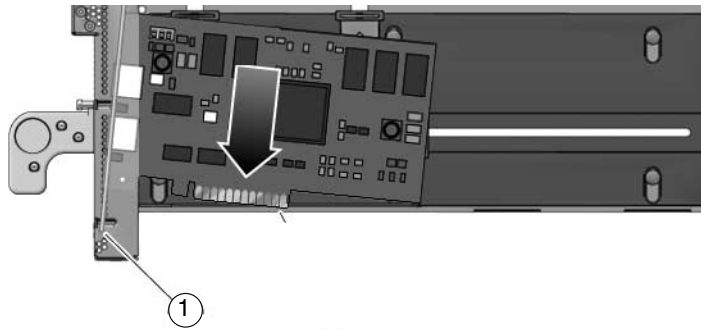
This action lowers the PCI card, facilitating the replacement of the card.



**FIGURE 3-10** Closing the Carrier Handle

Item	Description
1	Push carrier handle to the right
2	Push locking latch to the left

5. Remove the existing card from the carrier.
6. If you are installing an exact replacement, go to [Step 8](#).
7. For very small PCI cards (1.25 in./31 mm tall and/or 3.0 in./76 mm wide), it is necessary to do one or both of the following:
  - Move the long card lock from the horizontal slider slot to the front vertical slider slot, then slide it down to reach the top of the PCI card.
  - Rotate the fourth card lock 270 degrees counterclockwise from its parking position and slide it to the rear edge of the PCI card.
8. Place the PCI card on the carrier.
  - a. Place the front of the card inside the housing (FIGURE 3-11).



**FIGURE 3-11** Inserting the PCI Card

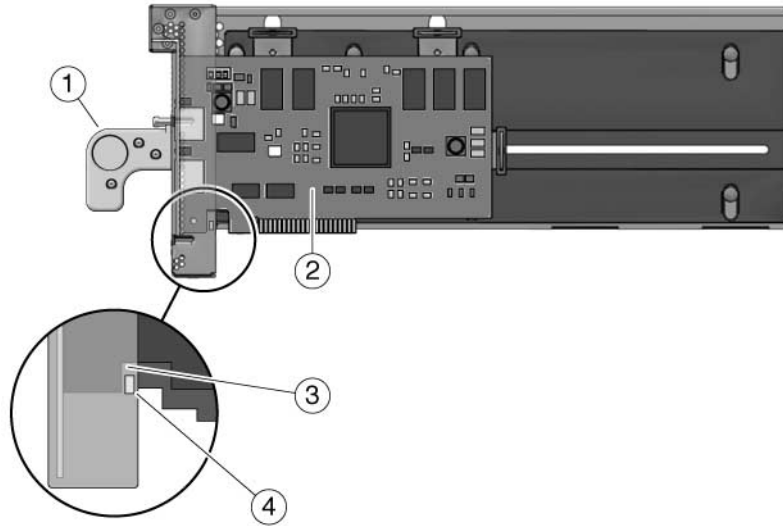
Item	Description
1	See the caution, below.



**Caution –** Do not allow the bottom edge of the PCI card bracket to tear the RFI gasket in the front of the carrier ([FIGURE 3-4](#)).

- b. Hook the notch (item 3 in [FIGURE 3-12](#)) on the bottom front of the card over the locator bar (item 4 in [FIGURE 3-12](#)). The locator bar is part of the bottom left corner of the carrier plate.

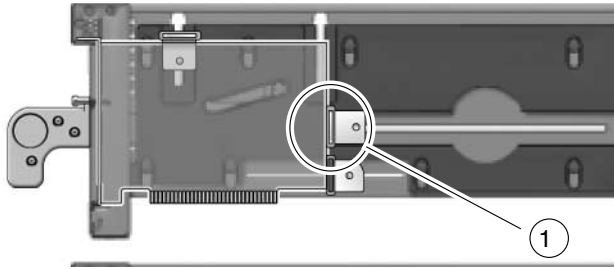




**FIGURE 3-12** Hooking the Card Notch Over the Locator Bar

Item	Description
1	Carrier locking handle (in closed position)
2	PCI card
3	Notch on bottom of PCI card
4	Detail of locator bar on the moveable plate

9. **Attach the PCI card to the carrier with one card lock:**
  - a. Slide a card lock to the right edge of the PCI card.
  - b. Hold the card in place and partially tighten the card lock screw.
  - c. Verify that the PCI card is not tilted, then tighten the card lock screw.



**FIGURE 3-13** Using Card Lock to Hold the PCI Card

Item	Description
1	Card lock

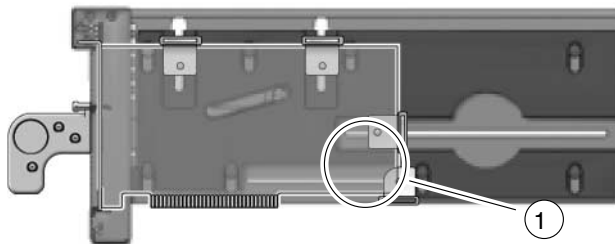
**10. Slide the remaining card locks to the edges of the PCI card and tighten the screws.**

The shape of a PCI card might prevent the use of some card locks. The minimum requirement is one card lock on the side of the PCI card and one card lock on the top.

**Note** – If the card lock screws are loose, the card locks will slip and the PCI card will not seat properly.



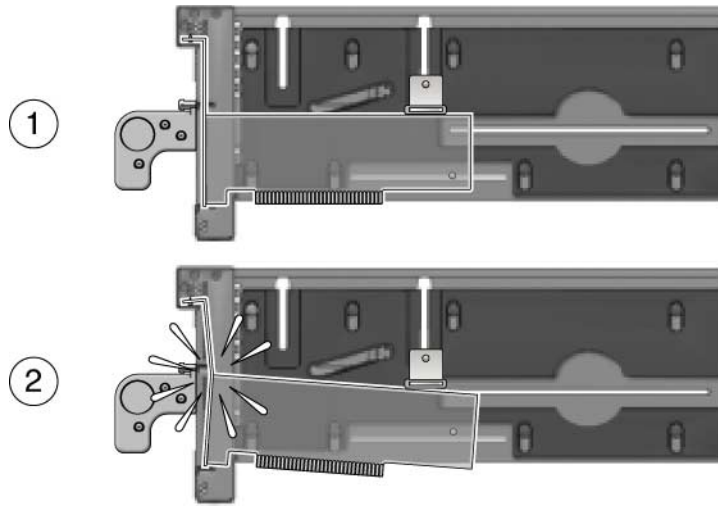
**Caution** – If the bottom card lock (Type C) is not used, leave it at the far right side of the slot ([FIGURE 3-14](#)). The PCI card will not seat properly if the bottom of the card lock touches the card socket.



**FIGURE 3-14** Correct Location for an Unused Type C Card Lock



**Caution** – Do not apply excessive pressure on the upper card locks. Too much vertical pressure will bend the PCI card bracket. See [FIGURE 3-15](#).



**FIGURE 3-15** Excessive Pressure Bends the PCI Card Bracket

Item	Description
1	Moderate pressure on an upper card lock holds the PCI card in a horizontal position.
2	Excessive pressure bends the PCI card bracket

**11. Pull the carrier handle into the fully open position to raise the carrier plate.**

If the carrier plate is not completely raised, the bottom edge will hit the card socket in the I/O boat in [Step 12](#) and [Step 13](#).

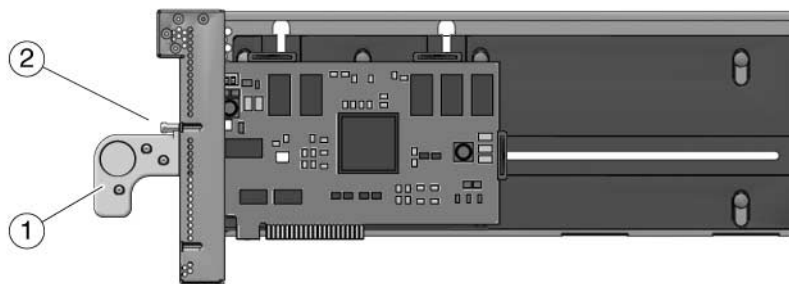
**12. Carefully place the carrier in the card guides at the top and bottom of the carrier slot in the I/O boat.**

**13. Push the carrier fully into the carrier slot, then push the carrier handle into the closed position ([FIGURE 3-9](#)).**

This action seats the PCI card in the card socket.



**Caution** – If the carrier handle does not close easily, the PCI card might not be seating properly in the card socket in the I/O boat. Remove the carrier and inspect the PCI card. If the bottom of the PCI card is not perfectly horizontal, loosen the card locks and realign the card on the carrier. For troubleshooting information, see [Appendix D](#)



**FIGURE 3-16** PCI Card and Carrier

Item	Description
1	Carrier handle (in closed position)
2	Carrier locking screw

14. Use the carrier locking screw located on the top of the handle to lock the carrier handle in place.
15. Add the PCI card to a Solaris domain.  
For details, refer to the service manual for your host server.

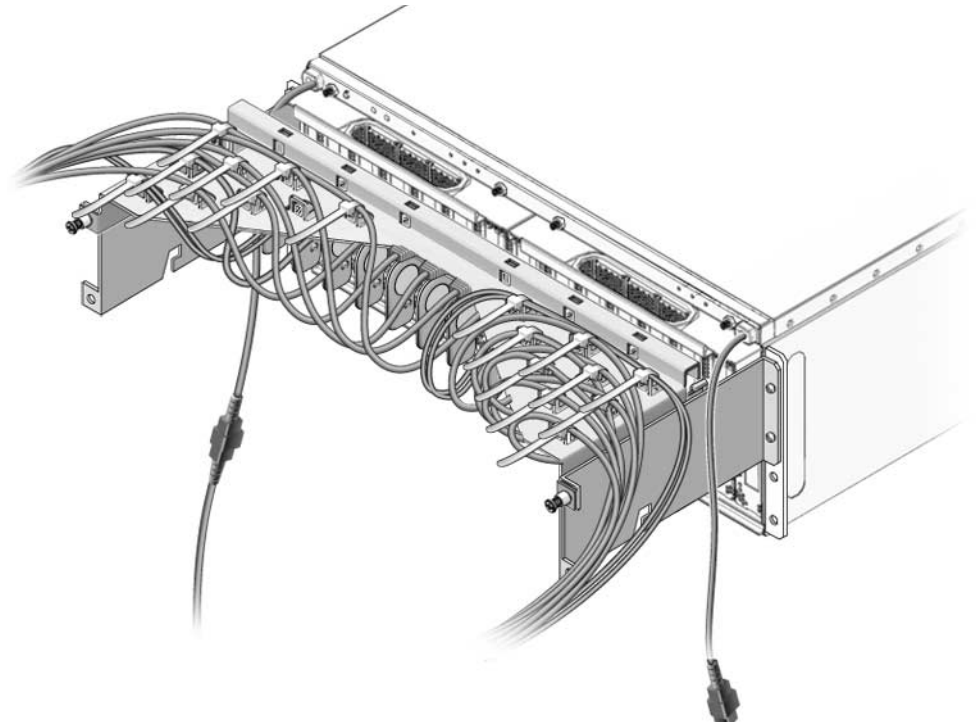
## 3.3 Installing Cables for PCI Cards

1. Use an antistatic strap for this procedure.
2. Route the cables across the top of the cable management unit as shown in [FIGURE 3-17](#).
  - a. Route the cables along the right and left sides of the cabinet.
  - b. Place the ends of the cables on the top of the cable plate, then curve the cables down to the corresponding PCI cards.
  - c. Use cable ties to hold the cables in place on the top of the cable management unit.

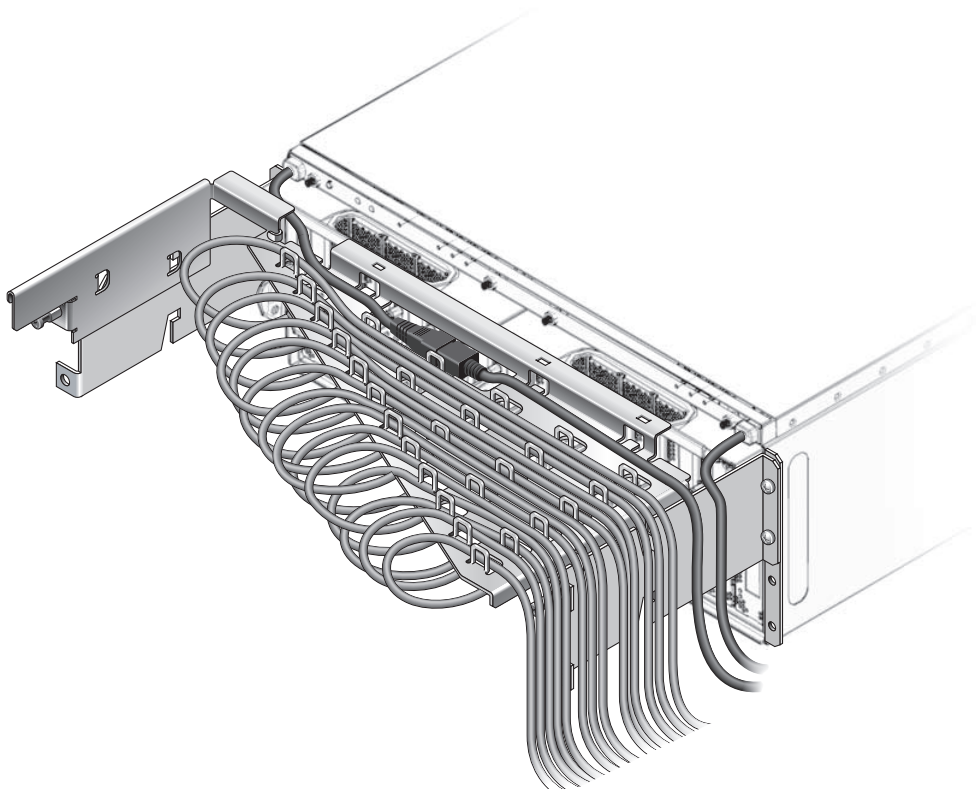
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**Note** – Before tightening the cable ties, ensure that each cable has a service loop (freedom of movement) of at least 2 inches (50mm). This allows the cable plate and cables to be moved from the normal position ([FIGURE 4-6](#)) to the service position without the need to untie the cables.

---



**FIGURE 3-17** Example of Cable Management for the Type A Cable Plate



**FIGURE 3-18** Example of Cable Management for the Type B Cable Plate

3. Attach I/O cables from the PCI cards and their respective devices or network ports.

# Servicing and Replacing Components

This chapter includes the service procedures for replacing field-replaceable units and installing optional assemblies.

For a list of service procedures, see the task map (TABLE 4-1).

## 4.1 Task Map

TABLE 4-1 Service Task Map

FRU	Task	Comments
PCI card	• Install a new PCI card	Section 3.1, “Installing a PCI Card” on page 3-1
	• Replace an existing PCI card	Section 3.2, “Replacing a PCI Card” on page 3-8
PSU	• Replace a PSU	Section 4.2, “Replacing a Power Supply Unit” on page 4-2
Carrier	• Replace a carrier	Section 4.3, “Replacing a Carrier” on page 4-5
Link	• Replace a link cable	Section 4.4, “Replacing a Link Cable” on page 4-7
	• Replace a link card in a host server	Section 4.5, “Replacing a Link Card in the Host Server” on page 4-7
	• Replace a link card in the I/O boat	Section 4.6, “Replacing a Link Card in an I/O Boat” on page 4-8
Cable Management	• Prepare the cable plate for I/O boat service	Section 4.7, “Preparing the Cable Plate for Service” on page 4-9

TABLE 4-1 Service Task Map

FRU	Task	Comments
I/O boat	• Install a second I/O boat	Section 4.8, “Installing a Second I/O Boat” on page 4-11
	• Replace an I/O boat	Section 4.9.1, “Replacing a Boat in a Single Boat Configuration” on page 4-13
	• Replace an I/O boat	Section 4.9.2, “Replacing a Boat in a Dual Boat Configuration” on page 4-14
Chassis	Replace the External I/O Expansion Unit chassis	Section 4.10, “Replacing the External I/O Expansion Unit Chassis” on page 4-16.

## 4.2 Replacing a Power Supply Unit

1. Use an antistatic strap for this procedure.
2. Unpack the new power supply unit and set it flat on an antistatic surface.



**Caution –** Do not rest a PSU vertically. The plastic electrical connector on the back is breakable.

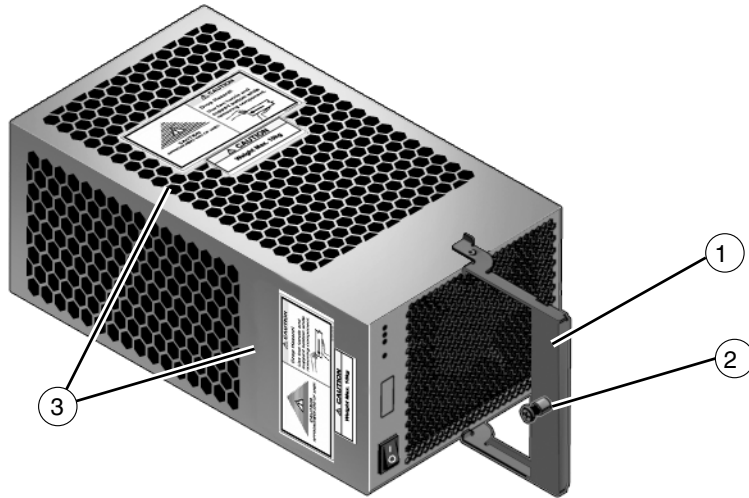
3. At the front of the defective PSU, turn off the PSU AC switch.
4. Loosen the handle locking screw on the PSU handle.



**Caution –** The PSU is heavy (7.5 lb/3.4 kg).

5. Unlock the PSU by swinging the handle out 90 degrees into the fully open position. (FIGURE 4-1)





**FIGURE 4-1** PSU

Item	Description
1	Handle
2	Handle locking screw
3	Warning labels

6. Place a hand under the PSU to prevent it from falling, then pull the PSU out of the External I/O Expansion Unit.

When you can see the warning label on the top of the PSU, the PSU is almost fully out of the PSU slot.



**Caution** – Do not allow the rear of the PSU to drop. The connector at the rear of the PSU can be damaged if it strikes the edge of the slot.

A pivoting flap behind the External I/O Expansion Unit drops down to prevent loss of cooling air.




7. Set the PSU flat on an antistatic surface.
8. Insert the new PSU into the External I/O Expansion Unit.  
The pivoting flap automatically swings up and out of the way.

---

**Note** – The fan in the new PSU turns on immediately if the External I/O Expansion Unit is running.

---

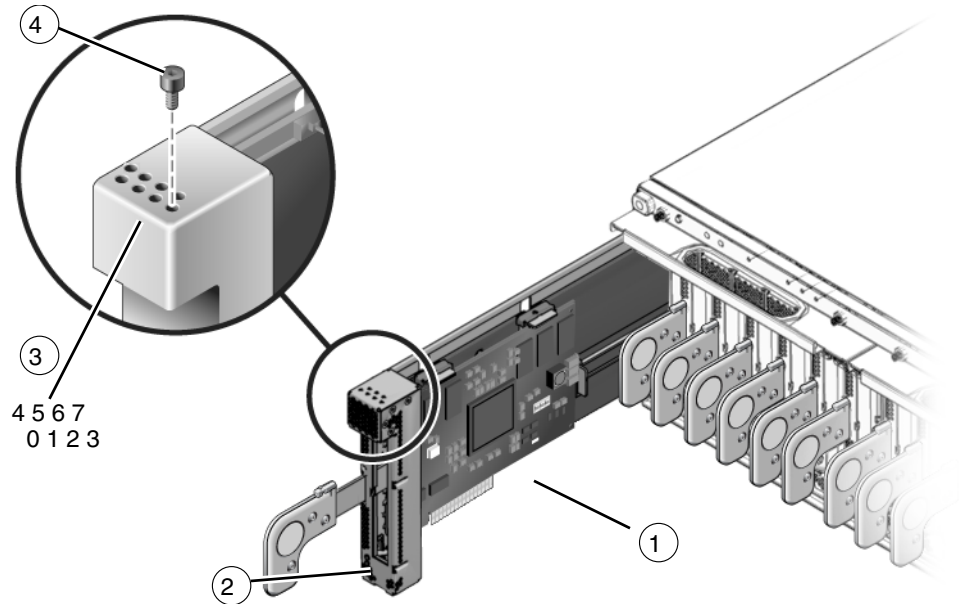
9. Turn the PSU handle 90 degrees into the closed position.
10. Secure the handle locking screw on the PSU handle.
11. Turn on the AC switch on the PSU.

The Fault/Locate LED (  ) lights up momentarily during the initialization then turns off. You should see the AC power (  ) and DC power (  ) LEDs turn on during the initialization.

For other LED indications, see [Appendix B](#).

## 4.3 Replacing a Carrier

A carrier is keyed to a specific slot in an I/O boat. The key is an M2 screw (FIGURE 4-2).



**FIGURE 4-2** Screw Hole Locations for the Carrier Slot Key

Item	Description
1	Carrier
2	Carrier label
3	Keyholes 0-7
4	Key

1. Use an antistatic strap for this procedure.
2. Remove the defective carrier from the I/O boat.
  - a. Loosen the carrier locking screw on the carrier handle.
  - b. Pull the carrier handle out fully.
  - c. Pull the carrier out of the carrier slot and place on an antistatic surface.

3. Install an M2 screw on the replacement carrier, in the key hole that corresponds to the slot number of the defective carrier.

4. Mark the carrier with the slot name and number.

The replacement carrier includes an assortment of adhesive labels including LINK 0, PCIX 1, PCIE 1, and so forth. Use the replacement label that corresponds to the label on the defective carrier. Place the label just below the opening in the front of the carrier (FIGURE 4-2).

5. Transfer the PCI card from the defective carrier to the replacement carrier.

a. Remove the dummy card from the replacement carrier by loosening the Phillips screws on the card locks.

b. Examine the defective carrier and determine which card locks on the replacement carrier will be used. Move the card locks on the replacement carrier to approximately the same locations as on the defective carrier.

One or more card locks on the replacement carrier might not be needed. Move the unused card locks out of the way or else remove them entirely from the carrier.

c. Unlock the PCI card from the defective carrier and install the card on the replacement carrier.

6. Carefully place the replacement carrier in the card guides at the top and bottom of the carrier slot in the I/O boat.

7. Slide the replacement carrier fully in the slot.

8. Seat the PCI card by pushing the carrier handle into the closed position.

A moderate pressure on the carrier handle is required to seat the PCI card into the slot.



---

**Caution** – If there is a large amount of resistance in the movement of the handle, the PCI card is not seating properly. Pull the carrier out and examine the PCI card for damage. If the card has moved out of position on the carrier or is not perfectly aligned with horizontal axis of the carrier, see [Appendix D](#)

---

9. Tighten the handle locking screw on the carrier handle.

---

## 4.4 Replacing a Link Cable

1. Use an antistatic strap for this procedure.
2. Halt all activity in the link card in the host server.

```
# cfgadm -disconnect slot#
```

Where *slot#* is the slot of the link card in the host server.

For details, refer to the service manual for your host server.

3. Disconnect the link cable from the link card in the I/O boat.
4. Disconnect the link cable from the link card in the host.
5. Connect the replacement link cable to the link card in the I/O boat.
6. Connect the replacement link cable to the link card in the host server.
7. Add the PCI card to a Solaris domain.

For details, refer to the service manual for your host server.

---

## 4.5 Replacing a Link Card in the Host Server

1. Use an antistatic strap for this procedure.
2. Halt all activity in the link card in the host server.

```
# cfgadm -disconnect slot#
```

Where *slot#* is the slot of the link card in the host server.

For details, refer to the service manual for your host server.

3. Disconnect the link cable from the link card in the host server.
4. Replace the link card in the host server.

The link card is a form of PCI Express card. Refer to the service manual for your host server for instructions on replacing PCI cards.

5. Connect the link cable to the replacement link card.

6. Add the PCI cards to their respective Solaris domains.

For details, refer to the service manual for your host server.

---

## 4.6 Replacing a Link Card in an I/O Boat

1. Use an antistatic strap for this procedure.
2. Halt all activity in the link card in the host server.

```
# cfgadm -disconnect slot#
```

Where *slot#* is the slot of the link card in the host server.

For details, refer to the service manual for your host server.

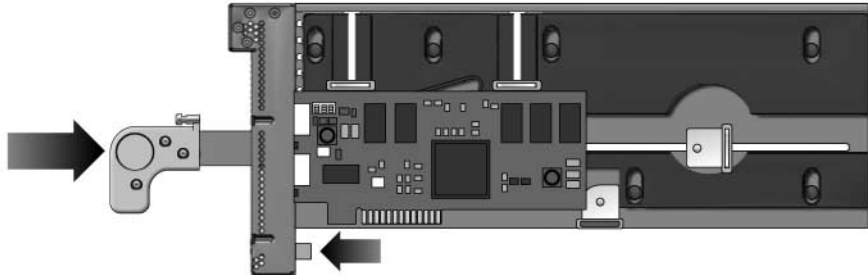
3. Loosen the two captive screws on the front of the I/O boat and pull the I/O boat out 1 in. (25 mm).

This step turns off electrical power to the I/O boat.

4. Disconnect the link cable from the defective link card in the I/O boat.
5. Remove the defective link card and carrier from slot 0 in the I/O boat.
  - a. Loosen the carrier locking screw on the carrier handle.
  - b. Pull the carrier handle out fully.
  - c. Pull the carrier out of the boat slot and place on an antistatic surface.

6. Press the locking latch (FIGURE 4-3) while you push the carrier handle into the closed position.

This action lowers the carrier plate, giving you room to move the PCI card into place on the carrier.



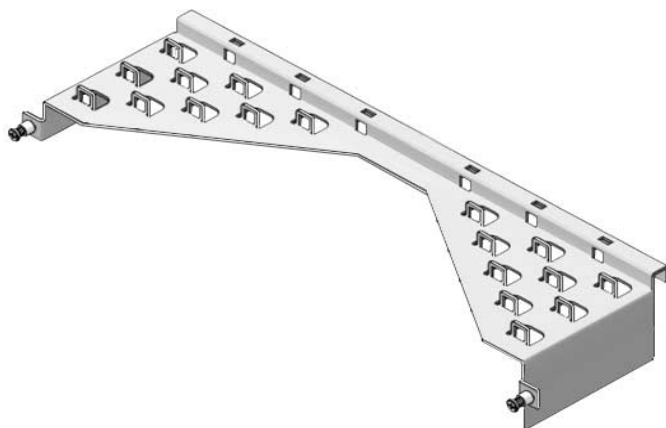
**FIGURE 4-3** Carrier Locking Latch

7. Remove the defective link card from the carrier.
8. Install the replacement link card in the carrier.
9. Install the carrier in slot 0 of the I/O boat.
10. Lock the carrier handle into place with the carrier locking screw located on the top of the handle.
11. Attach the link cable to the link card.
12. Push the I/O boat fully into its slot and tighten the two captive screws on the front of the I/O boat.  
This step turns on electrical power to the I/O boat
13. Add the PCI cards to their respective Solaris domains.  
For details, refer to the service manual for your host server.

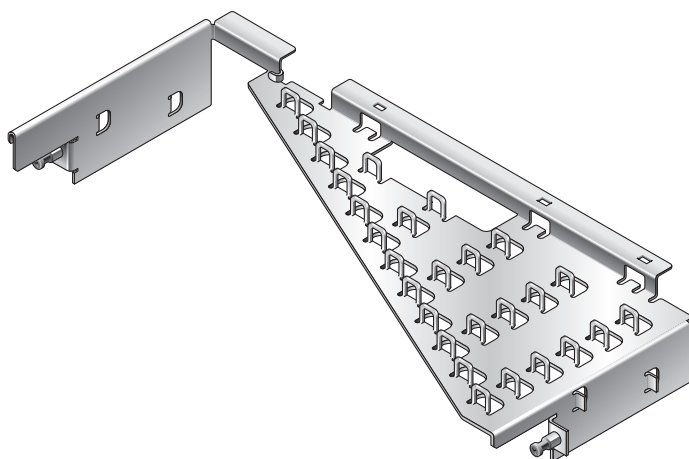
---

## 4.7 Preparing the Cable Plate for Service

1. Use an antistatic strap for this procedure.
2. Place the cable plate ([FIGURE 4-4](#) or [FIGURE 4-5](#)) in its service position ([FIGURE 4-6](#)) on the support brackets.



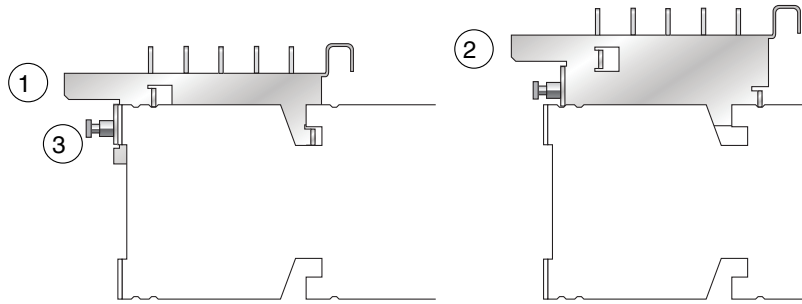
**FIGURE 4-4** Type A Cable Plate



**FIGURE 4-5** Type B Cable Plate

The left side of [FIGURE 4-6](#) shows the cable plate in its normal position. The right side of the illustration shows the service position.





**FIGURE 4-6** Cable Plate (Side Views of Normal and Service Positions)

Item	Description
1	Cable plate in the normal position (lowered)
2	Cable plate in the service position (raised)
3	Cable plate locking screw

## 4.8 Installing a Second I/O Boat

The following procedures apply to both types of I/O boat (PCI-X or PCI Express).

1. Use an antistatic strap for this procedure.
2. Unpack the new I/O boat and set it flat on an antistatic surface.



**Caution** – Do not rest an I/O boat vertically. The plastic electrical connector on the back is breakable.

3. Install a link card and carrier in the I/O boat, if not already installed.

The link card and carrier go into the LINK 0 at the left side of the boat.

4. Install PCI cards in the I/O boat.

- a. Remove one or more carriers from the boat.

Each carrier is keyed to fit in a specific slot. (The key is an M2 screw located at the top front of the carrier.) A label on the front of the carrier shows the slot number.

**b. Remove the dummy card from a carrier.**

One side of the dummy card provides instructions for removal from the carrier. The other side of the dummy card provides instructions for installing a PCI card.

**c. Install an PCI card on the carrier.**

For extra small cards (1.25 in./31 mm tall and/or 3.0 in./76 mm wide), it is necessary to do one or both of the following:

- Move the long card lock from the horizontal slider slot to the front vertical slider slot, then slide it down to reach the top of the PCI card.
- Rotate the fourth card lock 270 degrees counterclockwise from its parking position and slide it to the rear edge of the PCI card.

**d. Insert the carrier in its assigned slot and lock the handle into place with the carrier locking screw located on the top of the handle.**

**5. Raise the cable plate from the normal position to the service position (FIGURE 4-6).**

**6. Remove the filler panel from the target boat slot.**

A pivoting flap behind the External I/O Expansion Unit drops down to prevent loss of cooling air.

**7. Insert the I/O boat into the available slot.**

The pivoting flap automatically swings up and out of the way.

**8. Lock the I/O boat in place with the two captive screws at the top of the boat.**

**9. Lower the cable plate from the service position to the normal position (FIGURE 4-6).**

**10. Attach the applicable I/O cables to the PCI cards.**

**11. Attach the I/O cables to the cable management unit on the External I/O Expansion Unit.**

Allow approximately 2 inches (50 mm) of cable movement. This permits movement of the cable plate from its normal location to its service position.

**12. Install the remaining link card in the host server.**

Refer to documentation for your host server for instructions.

**13. Connect the link cable between the two link cards.**

**14. Add the PCI cards to Solaris domains.**

For details, refer to the service manual for your host server.

---

## 4.9 Replacing an I/O Boat

### 4.9.1 Replacing a Boat in a Single Boat Configuration

This is a cold service procedure.

1. Use an antistatic strap for this procedure.
2. Halt all activity in the link card in the host server.

```
# cfgadm -disconnect slot#
```

Where *slot#* is the slot of the link card in the host server.

For details, refer to the service manual for your host server.

3. At the front of the External I/O Expansion Unit, turn off the AC switches located on the PSUs.
4. Raise the cable plate from the normal position to the service position ([FIGURE 4-6](#)).
5. Remove the defective I/O boat from the External I/O Expansion Unit and set it flat on an antistatic surface.

When you can see the warning label on the top of the I/O boat, the boat is almost fully out of the boat slot.



---

**Caution** – Do not allow the rear of the I/O boat to drop. The connector at the rear of the boat can be damaged if it strikes the edge of the slot.

---



Do not rest an I/O boat vertically. The plastic electrical connector on the back is breakable.

A pivoting flap behind the I/O boat drops down to prevent loss of cooling air.

6. Insert the replacement I/O boat into the target slot.  
The pivoting flap automatically swings up and out of the way.
7. Lock the I/O boat in place with the two captive screws at the top of the boat.
8. Install a link card and carrier in the replacement I/O boat, if not already installed.  
The link card and carrier go into the LINK 0 slot at the left side of the boat.

9. Move PCI cards and carriers from the original I/O boat to the replacement I/O boat.
  - a. Remove one or more carriers from the defective I/O boat.

Each carrier is keyed to fit in a specific slot. (The key is an M2 screw located at the top front of the carrier.) A label on the front of the carrier shows the slot number.
  - b. Insert the carrier in its assigned slot in the replacement I/O boat and lock the handle into place with the carrier locking screw located on the top of the handle.
10. Lower the cable plate from the service position to the normal position (FIGURE 4-6).
11. Attach the applicable I/O cables to the PCI cards.
12. Connect the link cable between the link card in the host server and the link card in the I/O boat.
13. Turn on the AC switches) on the External I/O Expansion Unit PSUs.

On the PSUs the AC power () and DC power () LEDs should light.  
For other LED indications, see [Appendix B](#).
14. Add the PCI cards to Solaris domains.

For details, refer to the service manual for your host server.

## 4.9.2 Replacing a Boat in a Dual Boat Configuration

1. Use an antistatic strap for this procedure.
2. Halt all activity in the link card in the host server.

```
# cfgadm -disconnect slot#
```

Where *slot#* is the slot of the link card in the host server.

For details, refer to the service manual for your host server.

3. Raise the cable plate from the normal position to the service position (FIGURE 4-6).
4. Remove the defective I/O boat from the External I/O Expansion Unit and set it flat on an antistatic surface.

When you can see the warning label on the top of the I/O boat, the boat is almost fully out of the boat slot.



---

**Caution** – Do not allow the rear of the I/O boat to drop. The connector at the rear of the boat can be damaged if it strikes the edge of the slot.

---

Do not rest an I/O boat vertically. The plastic electrical connector on the back is breakable.

A pivoting flap behind the External I/O Expansion Unit drops down to prevent loss of cooling air.

**5. Insert the replacement I/O boat into the target slot.**

The pivoting flap automatically swings up and out of the way.

**6. Lock the I/O boat in place with the two captive screws at the top of the boat.**

**7. Install a link card and carrier in the replacement I/O boat, if not already installed.**

The link card and carrier go into slot 0 at the far left side of the boat.

**8. Move PCI cards and carriers from the defective I/O boat to the replacement I/O boat.**

**a. Remove one or more carriers from the defective I/O boat**

Each carrier is keyed to fit in a specific slot. (The key is an M2 screw located at the top front of the carrier.) A label on the front of the carrier shows the slot number.

**b. Insert the carrier in its assigned slot in the replacement I/O boat and lock the handle into place with the carrier locking screw located on the top of the handle.**

**9. Lower the cable plate from the service position to the normal position ([FIGURE 4-6](#)).**

**10. Attach the applicable I/O cables to the PCI cards.**

**11. Attach the I/O cables to the cable management unit on the External I/O Expansion Unit.**

Allow approximately two inches (50 mm) of cable movement. This permits movement of the cable management unit from its normal location to its service position. See [FIGURE 4-6](#).

**12. Connect the link cable between the link card in the host server and the link card in the I/O boat.**

**13. Add the PCI cards to a Solaris domain.**

For details, refer to the service manual for your host server.

---

## 4.10 Replacing the External I/O Expansion Unit Chassis

The replacement chassis consists only of a motherboard and the main shell. In this procedure, the following parts are moved from the old chassis to the replacement chassis:

- Front bezel
- Top cover
- I/O boat(s)
- PSUs.

### 4.10.1 Preparing the External I/O Expansion Unit for Service

1. Use an antistatic strap for this procedure.
2. Unpack the replacement chassis and place it on an antistatic work space.

---

**Note** – Use an antistatic work space that is wide enough to accommodate two External I/O Expansion Units side by side (40 in./1000 mm).

---

3. Halt all activity in the link card in the host server.

```
# cfgadm -disconnect slot#
```

Where *slot#* is the slot of the link card in the host server.

For details, refer to the service manual for your host server.

4. At the front of the External I/O Expansion Unit, turn off the AC switches located on the PSUs.
5. At the rear of the External I/O Expansion Unit, disconnect the AC cords from the internal AC cables.
6. Raise the cable plate from the normal position to the service position ([FIGURE 4-6](#)).
7. Label all I/O cables.
8. Disconnect all I/O cables from the PCI cards in the External I/O Expansion Unit.

## 4.10.2 Removing the External I/O Expansion Unit from the Rack

1. Use an antistatic strap for this procedure.
2. Remove the I/O boat(s) from the original External I/O Expansion Unit:
  - a. Loosen the two captive screws located at the top of the I/O boat.
  - b. Pull the I/O boat out of the chassis approximately 6 inches (150 mm).
  - c. Support the bottom of the I/O boat with one hand, then pull the boat out of the slot.
  - d. Set the I/O boat flat on an antistatic surface.



---

**Caution** – Do not rest an I/O boat vertically. The plastic electrical connector on the back is breakable.

---

- e. Note which boat is boat 0 and which is boat 1 so that they will go in the same slots in the replacement chassis.

It might be helpful to label the boats.

3. Remove the PSUs from the front of the External I/O Expansion Unit:
  - a. Loosen the handle locking screw on the PSU handle.
  - b. Unlock the PSU by pulling it out 90 degrees.



---

**Caution** – The PSU is heavy (7.5 lb/3.4 kg).

---

- c. Pull the PSU out approximately 6 in. (150 mm) and stop.

When you can see the warning label on the top of the PSU, the PSU is almost fully out of the PSU slot.



---

**Caution** – Do not allow the rear of the PSU to drop. The connector at the rear of the PSU can be damaged if it strikes the edge of the slot.

---

- d. Support the bottom of the PSU with one hand, and pull the PSU out of the External I/O Expansion Unit.
  - e. Set the PSU flat on an antistatic surface.



---

**Caution** – Do not rest a PSU vertically. The plastic electrical connector on the back is breakable.

---

4. **Remove the External I/O Expansion Unit chassis from the rack.**
  - a. **Use a Phillips #2 screwdriver to remove the four mounting screws from the front of the chassis (FIGURE 2-11).**
  - b. **Pull the chassis out of the cabinet and place it on an antistatic workbench.**

The empty chassis weighs 30 lb (13.6 kg).

### 4.10.3 Moving the Bezel and Top Cover

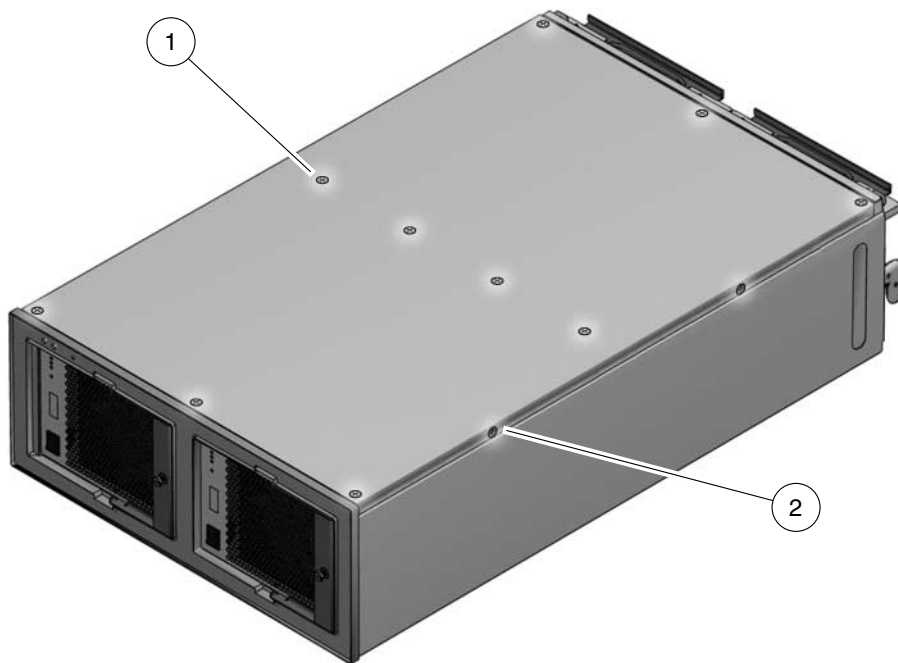
1. **Use an antistatic strap for this procedure.**
2. **Use a Phillips #1 screwdriver to remove the top cover (FIGURE 4-7).**

There are 14 screws on the cover:

- 2 screws on the right side
- 2 screws on the left side
- 10 screws on the top

3. **Set the cover aside.**

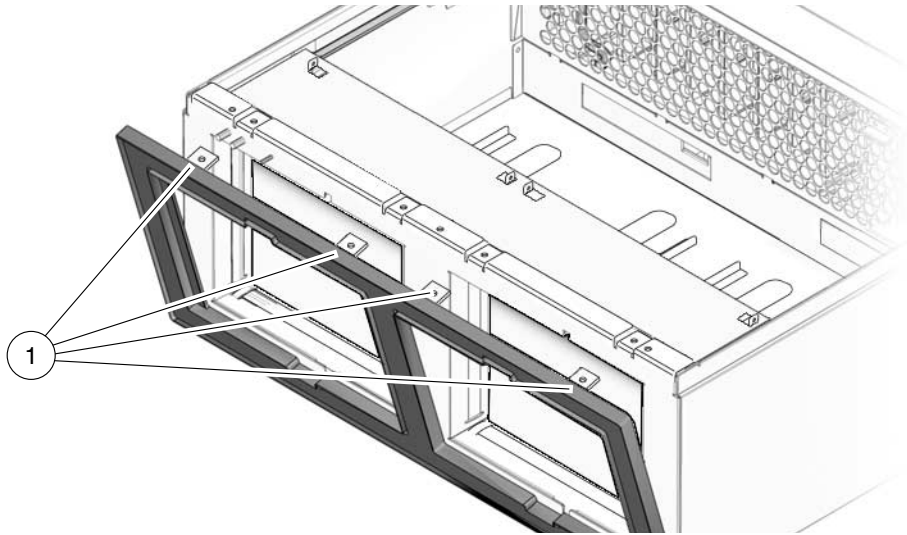




**FIGURE 4-7** Removing the Chassis Top Cover

Item	Description
1	Top screw locations (10 total)
2	Side screw locations (4 total)

4. Use a Phillips #1 screwdriver to remove 4 screws from the top of the bezel ([FIGURE 4-8](#)), then tilt the top of the bezel away from the External I/O Expansion Unit and lift it off.

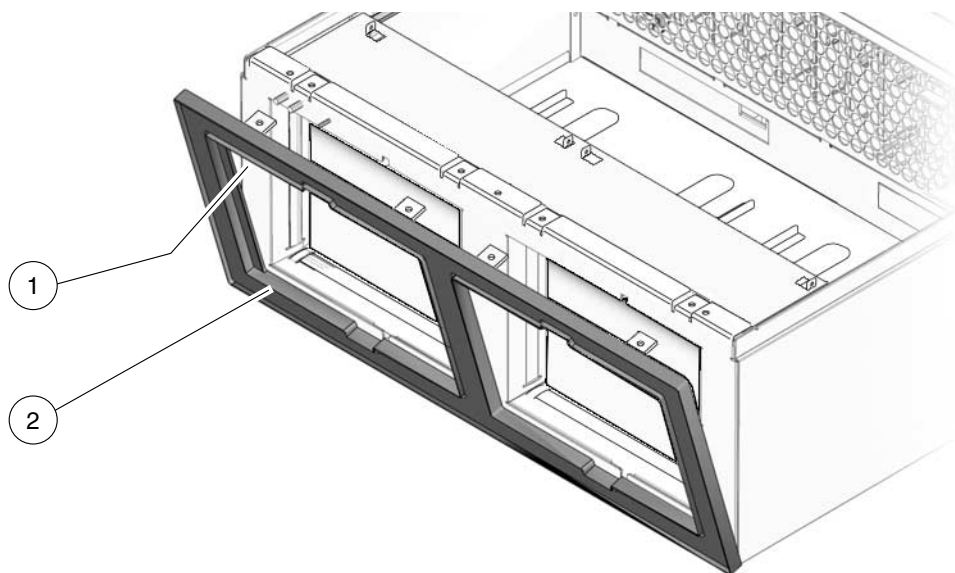


**FIGURE 4-8** Bezel Screws

Item	Description
1	Bezel screws

**5. Install new serial number labels on the bezel.**

The current serial number labels are located at the left PSU opening of the bezel ([FIGURE 4-9](#)).



**FIGURE 4-9** Serial Number Labels

Item	Description
1	Upper serial number label
2	Lower serial number label

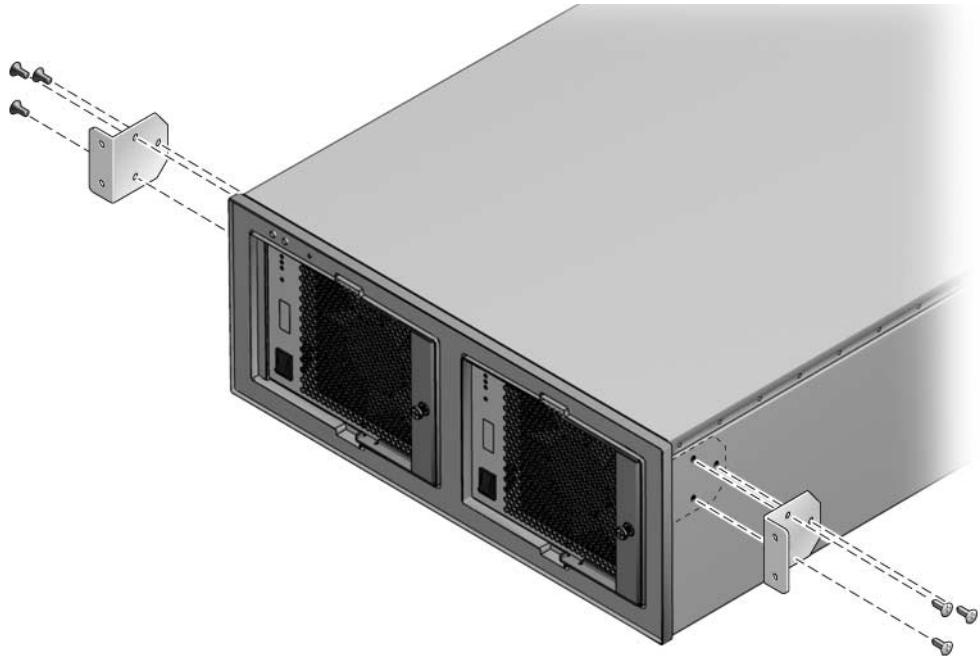
6. **Install the bezel on the replacement External I/O Expansion Unit:**
  - a. **Tilt the bezel away from the External I/O Expansion Unit approximately 10 degrees.**
  - b. **Place the bottom edge of the bezel under the front of the chassis.**

The lugs on the bottom of the chassis front fit into the slots in the bezel.
  - c. **Tilt the bezel upright and use 4 Phillips #1 screws to attach the top of the bezel to the replacement chassis.**
7. **Install the top cover.**

Install 10 Phillips #1 screws on the top. Install 2 Phillips #1 screws on each side.

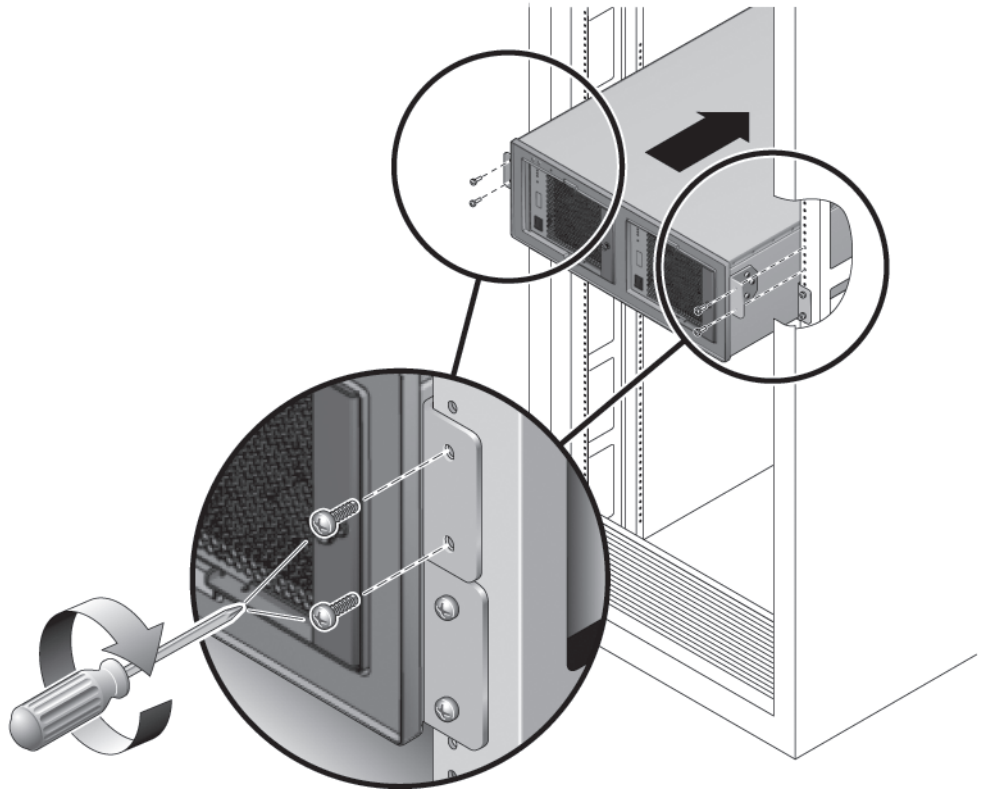
## 4.10.4 Installing the External I/O Expansion Unit in the Rack

1. Use an antistatic strap for this procedure.
2. Use a Phillips #2 screwdriver to remove the left and right chassis lock brackets from the sides of the old chassis ([FIGURE 4-10](#)).



**FIGURE 4-10** Uninstalling the Chassis Lock Brackets

3. Install the brackets on the sides of the replacement chassis.
4. Slide the replacement chassis into the rack and lock the chassis in place, using two Phillips #2 screws on each side ([FIGURE 4-11](#)).





**FIGURE 4-11** Installing the External I/O Expansion Unit in the Rack

5. At the front of the chassis, install the PSUs:
  - a. Pull the PSU handle to the unlocked position.
  - b. Slide the PSU into the slot until the rear of the PSU contacts the centerplane.
  - c. Turn the PSU handle into the locked position.
  - d. Tighten the handle locking screw on the handle.
  - e. Verify that the AC switches are in the Off position.
6. At the rear of the chassis, install the I/O boats.
  - a. Carefully slide I/O boat 0 into slot 0.  
Lift the I/O cables out of the way as necessary.

- b. Lock the I/O boat in place by tightening the two screws at the top corners of the I/O boat.
  - c. Install I/O boat 1 in the same manner.
- 7. Lower the cable plate from the service position to the normal position ([FIGURE 4-6](#)).
- 8. Attach the I/O cables to the PCI cards.
- 9. For each I/O boat, attach the link cable(s) to the link card in the boat.

For an optical link card, there are two connections. Insert the TX cable into the link card port marked “TX” and insert the RX cable into the port marked “RX”.

For a copper-conductor link card, there is a single connection.
- 10. Connect AC cords to the internal AC cables on the External I/O Expansion Unit.
- 11. Turn on the AC switches) on the External I/O Expansion Unit PSUs.

On the PSUs the AC power () and DC power () LEDs should light.

For other LED indications, see [Appendix B](#).
- 12. Add the PCI card to a Solaris domain.

For details, refer to the service manual for your host server.

# Specifications

This guide provides the specifications and site requirements you need when planning for the installation of an External I/O Expansion Unit.

## A.1 Physical Specifications

Measure	U.S.	Metric
Width	17.3 in	440 mm
Depth	29 in	730 mm
Depth with cable management unit	39 in	1000 mm
Height (4 rack units)	6.9 in	175 mm
Weight with 1 I/O boat and 2 PSUs	63 lb	28.6 kg
Weight with 2 I/O boats and 2 PSUs	81 lb	36.8 kg

## A.2 Clearance for Service Access

These are the minimum clearances needed for External I/O Expansion Unit maintenance.

Description	U.S.	Metric
Clearance, front of system	36 in.	915 mm
Clearance, rear of system	36 in.	915 mm

---

## A.3 Environmental Specifications

Specification	Operating	Non-operating
Temperature	5 to 35°C (at sea level)	-40 to 60°C
Humidity	20 to 80% RH, non-condensing, 27°C wet bulb, IEC 60068-2-3&56	98% RH 38°C, non-condensing, IEC 60068-2-3&56
Altitude	0-3,000 meters (0-10,000 feet) IEC 60068-2-13	0 - 12,000 meters (0-40,000 feet) IEC 60068-2-13
Vibration	0.2 GS, swept sine 5-500-5Hz, 1 octave/min, all axes, IEC 60068-2-13	1.0 GS, swept sine 5-500-5Hz, 1 octave/min, all axes, IEC 60068-2-13
Shock	5 GS peak 11 milliseconds, half-sine pulse, IEC 60068-2-27	30 GS peak 11 milliseconds, half-sine pulse, IEC 60068-2-27

---

## A.4 Power Source Requirements

Description	Specification
Input voltage range	100 VAC to 240 VAC, 50-60 Hz
Maximum input current	8.0 A at 100 VAC 4.0 A at 220 VAC
Maximum input power	600 W
Phases	Single

---

**Note** – To ensure redundant operation of the power supplies, the two power cords should be connected to separate AC circuits.

---



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## A.5 Acoustic Noise Emissions.

Description	Mode	Specification
LwAd (1 B = 10 dB)	Operating acoustic noise	6.7 B
	Idling acoustic noise	6.7 B
LpAm (bystander positions)	Operating acoustic noise	59 dBA
	Idling acoustic noise	59 dBA

---

**Note** – Declared noise emissions are in accordance with ISO 9296 standards.

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## A.6 Agency Compliance Specifications

The External I/O Expansion Unit complies with the following specifications.

Category	Relevant Standards
Safety Standards	UL/CSA60950-1, EN60950-1, IEC60950-1, IEC825 and CB Scheme with all national differences
Emissions	FCC, EN55022/CISPR22(All Class A) & EN61000-3-2 & -3-3
Immunity	EN55024, EN61000-4-2, -4-3, -4-5, -4-5, -4-6, -4-8, -4-11, EN300-386
Regulatory markings system level	CE, UL, BSMI, FCC, VCCI, ICES, C-tick, GOST-R, MIC, WEEE, & China RoHS
Regulatory markings power supply level	CE, UL, BSMI, GOST-R, MIC, CCC, S-mark
Radiated Emissions Report formats	FCC, VCCI, BSMI & CISPR22

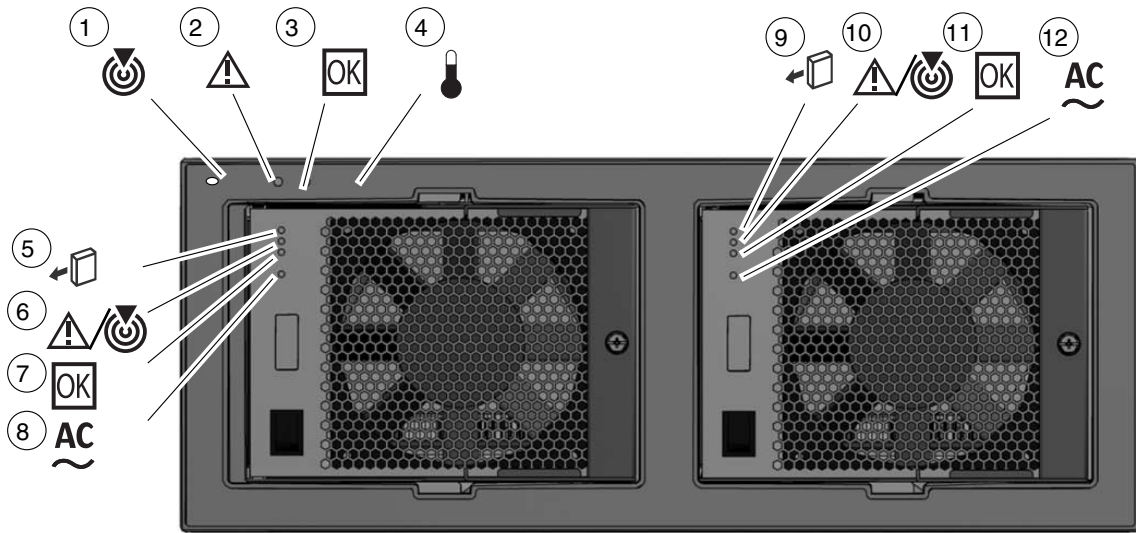


## External I/O Expansion Unit LED Status Indicators

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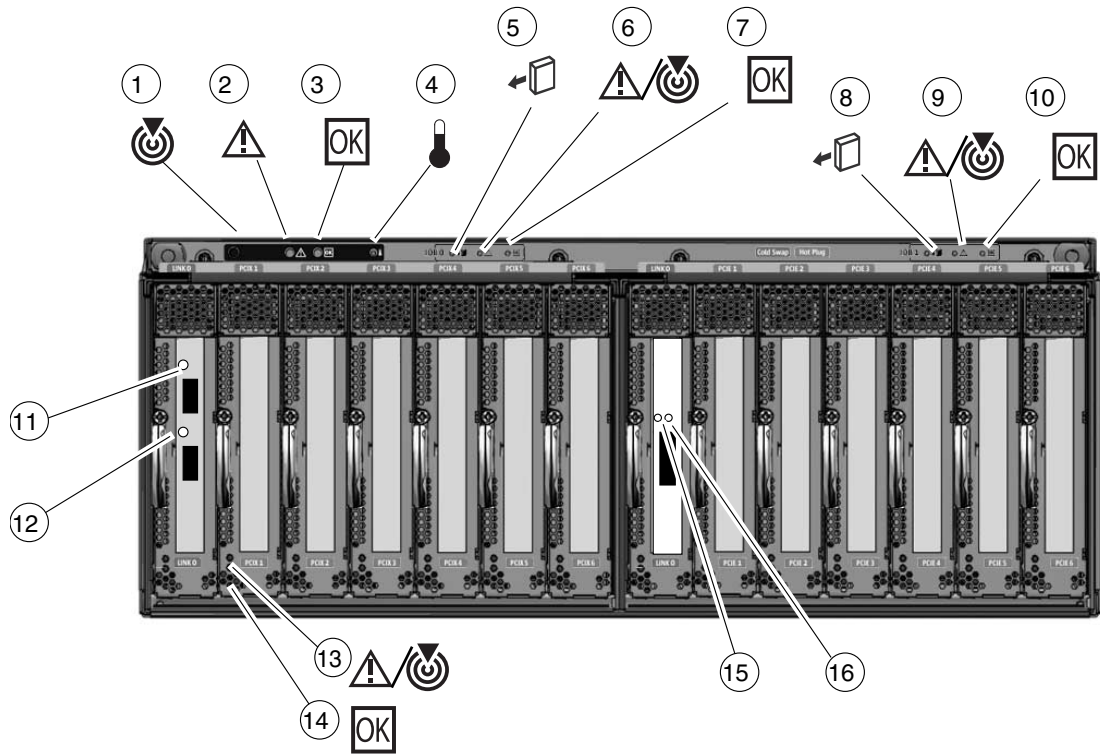
The following tables list the status states for the LEDs on the front ([FIGURE B-1](#)) and rear ([FIGURE B-2](#)) of the External I/O Expansion Unit.

- [TABLE B-1](#), External I/O Expansion Unit chassis (Front)
- [TABLE B-2](#), External I/O Expansion Unit chassis (Rear)
- [TABLE B-3](#), I/O boat
- [TABLE B-4](#), Power supply unit (PSU)
- [TABLE B-5](#), Carrier
- [TABLE B-6](#), Link card
- [TABLE B-8](#), PCI cards



**FIGURE B-1** LEDs on the Front of the Chassis

Item	LED Description	Item	LED Description
1	Chassis locate (LED and switch)	7	PSU0 DC power
2	Chassis fault/service required	8	PSU0 AC power
3	Chassis power	9	PSU1 ready to remove
4	Chassis overtemp	10	PSU1 fault/locate
5	PSU0 ready to remove	11	PSU1 DC power
6	PSU0 fault/locate	12	PSU1 AC power



**FIGURE B-2** LEDs on the Rear of the Chassis





Item	LED Description	Item	LED Description
1	Chassis locate (LED and switch)	9	I/O boat 1 fault/locate
2	Chassis fault/service required	10	I/O boat 1 DC power
3	Chassis power	11	Link card data (optical card option)
4	Chassis overtemp	12	Link card management (optical card option)
5	I/O boat 0 ready to remove	13	Slot attention/locate (all PCI carriers)
6	I/O boat 0 fault/locate	14	Slot power (all PCI carriers)
7	I/O boat 0 DC power	15	Link card data (copper conductor option)
8	I/O boat 1 ready to remove	16	Link card management (copper conductor option)

**Note** – The Locate LED is a lighted push-button switch. When the flashing of its LED has helped you to locate the External I/O Expansion Unit, turn off the LED by pressing the switch. Note that the LED will not turn off if you press less than 0.5 seconds. You can also manually turn on the LED by pressing the button.





# B.1 LED States

**Note** – Text shown in bold font indicates the normal operating state for each LED.




**TABLE B-1** External I/O Expansion Unit Chassis (Front)

LED Name	Color	State	Meaning
 Locate	White	<b>Off</b> Flash	The unit is located here. (4 Hz) To turn off the flashing LED, press the button for 0.5 second or longer.
 Fault/service required	Amber	<b>Off</b> On	<b>No fault.</b> Fault present.
 Power	Green	<b>On</b> Off Flash	<b>Chassis power on, one or both boats on.</b> Chassis power off. Chassis power on, all boats off (0.3 Hz)
 Overtemp	Amber	<b>Off</b> On	<b>Temperature okay.</b> Unit needs attention.





**TABLE B-2** External I/O Expansion Unit Chassis (Rear)

LED Name	Color	State	Meaning
 Locate	White	<b>Off</b> Flash	The unit is located here. (4 Hz) To turn off the flashing LED, press the button for 0.5 second or longer.
 Fault/service required	Amber	<b>Off</b> On	<b>No fault.</b> Fault present.
 OK	Green	<b>On</b> Off Flash	<b>Chassis power on, one or both boats on.</b> Chassis power off. Chassis power on, all boats off (0.3 Hz)
 Overtemp	Amber	<b>Off</b> On	<b>Temperature okay.</b> Unit needs attention.



**TABLE B-3** I/O Boat

LED Name	Color	State	Meaning
 Power	Green	<b>On</b> Off Flash	<b>Boat power on, and boat is managed.</b> Boat power off. <b>Boat power on, and boat is not managed</b>
 Fault/Locate	Amber	<b>Off</b> On Flash	<b>No fault.</b> Fault present. Locate on.
 Ready to remove	Blue	<b>Off</b> On	<b>Not ready to remove.</b> Ready to remove.

**TABLE B-4** Power Supply Unit (PSU0 and PSU1)

LED Name	Color	State	Meaning
 Ready to remove	Blue	<b>Off</b> On	<b>Not ready to remove.</b> Ready to remove.
 Fault/Locate	Amber	<b>Off</b> On Flash	<b>No fault.</b> Fault present. Locate on.
 AC Power	Green	<b>On</b> Off	<b>AC input.</b> No AC input.
 DC Power	Green	<b>On</b> Off	<b>DC output.</b> No DC output.

**TABLE B-5** Carriers 1-6

LED Name	Color	State	Meaning
 Power*	Green	<b>On</b>	<b>Card in slot.</b>
		Off	Slot empty.
		Flash	Power transition in progress.
 Attention/Locate	Amber	<b>Off</b>	<b>No fault.</b>
		On	Fault present.
		Flash	Locate on. (1 Hz)

\* When the External I/O Expansion Unit is first powered on, a lighted Power LED means the slot has power. An unlighted Power LED means the slot is not powered.

**TABLE B-6** Link Card (Optical Fiber Version)

LED Name	Color	State	Meaning
Data (upper LED)	Green	<b>On</b>	<b>x8 PCI Express links.</b>
		Off	Link is down.
		Flash	x4 PCI Express link (degraded state). (1Hz slow flash)
		Flash	x1 PCI Express link (degraded state). (0.3Hz very slow flash)
Management (lower LED)	Green	<b>On</b>	<b>Management link is up. (Flashes in time with data traffic)</b>
		Flash	Management link is down. (0.3 Hz very slow flash)
		Off	Link card power is off.

**Note** – On the optical link card, the LEDs for link card data and link card management are located next to the optical cable sockets. Although the LEDs are near the sockets, they do not have any direct relationship to the sockets and are not intended to indicate the activity of the optical cable sockets.



**TABLE B-7** Link Card (Copper Conductor Version)

LED Name	Color	State	Meaning
Data (right LED)	Green	On	<b>x8 PCI Express links.</b>
		Off	Link is down.
		Flash	x4 PCI Express link (degraded state). (1Hz slow flash)
		Flash	x1 PCI Express link (degraded state). (0.3Hz very slow flash)
Management (left LED)	Green	On	<b>Management link is up. (Flashes in time with data traffic)</b>
		Flash	Management link is down. (0.3 Hz very slow flash)
		Off	Link card power is off.

**TABLE B-8** Individual PCI Card

LED Name	Color	State	Meaning
All details depend on the manufacturer's design.			



# PCI Cards and Device Mapping

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This appendix shows examples of device maps (device paths) for PCI cards in an External I/O Expansion Unit attached to a host system. Use this information to identify and locate PCI cards in the External I/O Expansion Unit I/O boats.

---

## C.1 Device Mapping

When the host server is booted, the OpenBoot PROM creates a map of devices internal and external to the host server. When mapping the external devices, the OpenBoot PROM starts from the host's I/O Unit (IOU) slots. For the External I/O Expansion Unit, the device map includes circuitry in the I/O boats, the PCI cards in the I/O boats, and the external devices that are connected to the PCI cards.

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**Note** – The External I/O Expansion Unit's link cards and link cable do not appear in the device map. When you install a link card in the host server, the OpenBoot PROM will not detect that card. After you connect the link cable(s) between the link card in the host server and the link card in an I/O boat, the OpenBoot PROM can detect circuitry and any PCI cards in the I/O Boat.

---

The host server's IOU slots are identified by various device path names such as `/pci@x0,600000`, `/pci@x1,700000`, `/pci@x2,600000`, and so forth. These names vary according to the location of the I/O unit (IOU) in the host, and by the slot location in the I/O unit. For the IOU slot names, see [TABLE C-1](#) and [TABLE C-2](#).

**TABLE C-1** lists the IOU slots in the SPARC Enterprise M4000/M5000 servers. For more information about IOU slot names, refer to the discussions of I/O device mapping in the *SPARC Enterprise M4000/M5000/M8000/M9000 Servers Administration Guide*.

**TABLE C-1** IOU Slots in SPARC Enterprise M4000/M5000 Servers

IOU Slot	OpenBoot PROM Device Path Name
IOU Slot 0*	/pci@x0,600000/pci@0/pci@8/pci@0,1
IOU Slot 1	/pci@x0,600000/pci@0/pci@9
IOU Slot 2	/pci@x1,700000
IOU Slot 3	/pci@x2,600000
IOU Slot 4	/pci@x3,700000

\* Slot 0 is a PCI-X slot. The External I/O Expansion Unit link card cannot be used in this slot.

**TABLE C-2** lists the IOU slots in the SPARC Enterprise M8000/M9000 servers. For more information about IOU slot names, refer to the discussions of I/O device mapping in the *SPARC Enterprise M4000/M5000/M8000/M9000 Servers Administration Guide*.

**TABLE C-2** IOU Slots in SPARC Enterprise M8000/M9000 Servers

IOU Slot	OpenBoot PROM Device Path Name
IOU Slot 0	pci@x0,600000
IOU Slot 1	pci@x1,700000
IOU Slot 2	pci@x2,600000
IOU Slot 3	pci@x3,700000
IOU Slot 4	pci@x4,600000
IOU Slot 5	pci@x5,700000
IOU Slot 6	pci@x6,600000
IOU Slot 7	pci@x7,700000

The OpenBoot PROM maps several types of connecting devices inside the I/O boats in the External I/O Expansion Unit. These connecting devices generally have multiple I/O ports which appear in the OpenBoot PROM report as pci@0, pci@1, pci@0,1, and so forth. These connecting devices are switching circuits which switch between multiple inputs, and bridge circuits, which connect PCI-X buses to PCI Express buses.

## C.2 Device Map Examples

As shown in the diagrams below, the OpenBoot PROM displays the following parts in sequence for each PCI card in an External I/O Expansion Unit:

- The I/O Unit (IOU) slot in the server
- Multiple devices inside the I/O boat
- The PCI card in the I/O boat
- Disk drives, SCSI ports, or networks that connect to the PCI card

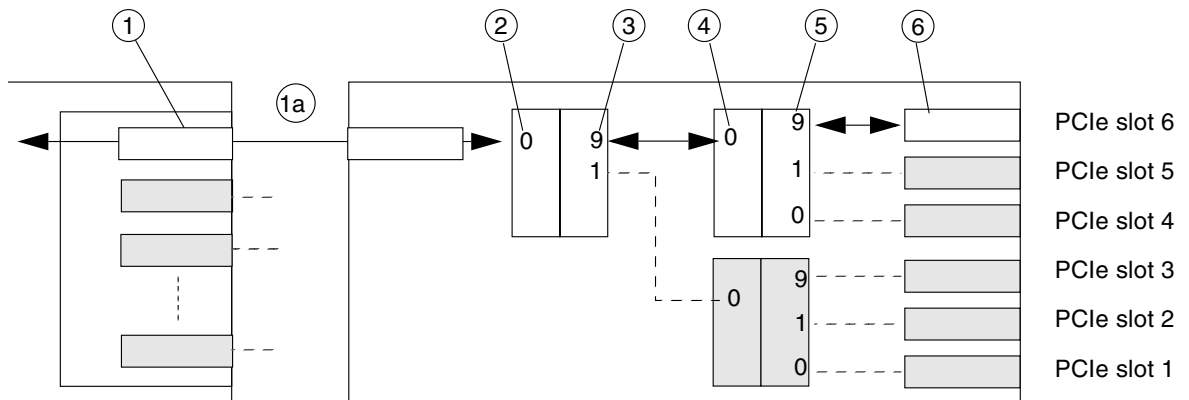
### C.2.1 Device Map for PCI Express Cards

This is an example of a complete device path for a PCI Express (PCIe) card in a PCI Express boat:

```
/IOU_slot/pci@0/pci@9/pci@0/pci@9/abc@n
```

*IOU\_slot* is the IOU slot to which the link card for a External I/O Expansion Unit) is connected. See [TABLE C-1](#) and [TABLE C-2](#).

[FIGURE C-1](#) shows the device path for a PCI Express card. The device path is the accumulation of ports from the host data bus (item 1) to the PCI card (item 6).



**FIGURE C-1** Device Path for PCI Express (PCIe) PCI Cards

**TABLE C-3** Parts of a Device Path for a PCI Express I/O Boat

Item	Description	Device Tree Path Example
1	IOU slot	/pci@xy,700000
1a	link cards	(Nothing is displayed for link cards. This is normal behavior. They are not visible to the OpenBoot PROM.)
2	/pci@0	/pci@xy,700000/pci@0
3	/pci@9	/pci@xy,700000/pci@0/pci@9
4	/pci@0	/pci@xy,700000/pci@0/pci@9/pci@0
5	/pci@9	/pci@xy,700000/pci@0/pci@9/pci@0/pci@9
6	PCI card	/pci@xy,700000/pci@0/pci@9/pci@0/pci@9/abc@n

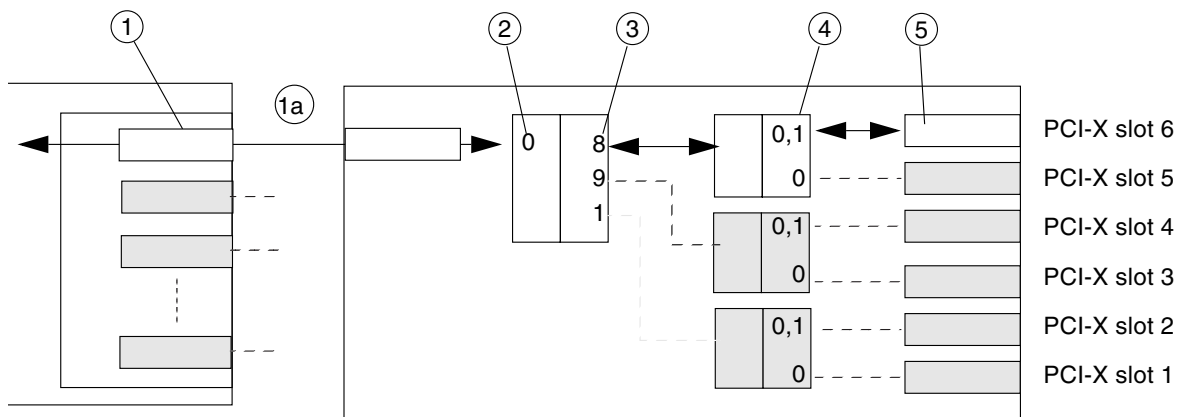
## C.2.2 Device Map for PCI-X Cards

This is an example of a complete device path for a PCI-X card in a PCI-X boat:

```
/IOU_slot/pci@0/pci@8/pci@0/abc@n
```

*IOU\_slot* is the IOU slot to which the link card for a External I/O Expansion Unit is connected. See [TABLE C-1](#) and [TABLE C-2](#).

[FIGURE C-2](#) shows the device path for a PCI-X card. The device path is the accumulation of ports from the IOU slot (item 1) to the PCI card (item 5).



**FIGURE C-2** Device Path for PCI-X PCI Cards

**TABLE C-4** Parts of a Device Path for a PCI-X I/O Boat

Item	Description	Device Tree Path Example
1	IOU slot	<code>/pci@xy,700000</code>
1a	link cards	(Nothing is displayed for link cards. This is normal behavior. They are not visible to the OpenBoot PROM.)
2	<code>/pci@0</code>	<code>/pci@xy,700000/pci@0</code>
3	<code>/pci@8</code>	<code>/pci@xy,700000/pci@0/pci@8</code>
4	<code>/pci@0</code>	<code>/pci@xy,700000/pci@0/pci@8/pci@0</code>
5	PCI card	<code>/pci@xy,700000/pci@0/pci@8/pci@0,1/abc@n</code>

# C.3 Software Commands for the External I/O Expansion Unit

From the host server, you can use the following commands to identify and locate the PCI cards in the I/O boats:

TABLE C-5 Diagnostic and Maintenance Commands

Command	Comments	Reference
<code>ioxadm (8)</code>	The <code>ioxadm (8)</code> command displays information about the External I/O Expansion Unit. System administrators and service personnel can use <code>ioxadm</code> to manage External I/O Expansion Unit functions.	TABLE C-7
<code>show-devs</code>	Displays device tree information for PCI cards and other devices attached to the host. Run this command from the OpenBoot prompt.	CODE EXAMPLE C-1
<code>cfgadm (1M)</code>	The <code>cfgadm (1M)</code> command displays dynamic reconfiguration information for a system. Run this command from the Solaris superuser prompt.	CODE EXAMPLE C-2
<code>prtdiag (1M)</code>	The <code>prtdiag (1M)</code> command displays system configuration and any failed field replaceable units (FRUs). Run this command from the Solaris superuser prompt.	CODE EXAMPLE C-3

For the following examples of program output, assume an External I/O Expansion Unit has one PCI Express boat and one PCI-X boat. The boats contain six PCI cards each:

TABLE C-6 PCI Cards in a Typical External I/O Expansion Unit

Boat	Slot	PCI Card
PCI Express boat	1	Dual gigabit Ethernet
	2	Dual gigabit Ethernet
	3	Dual gigabit Ethernet
	4	4 gigabit fibre channel
	5	Dual 4 gigabit fibre channel
	6	Dual 4 gigabit fibre channel
PCI-X boat	1	Quad gigabit Ethernet
	2	4 gigabit fibre channel
	3	Gigaswift gigabit Ethernet



**TABLE C-6** PCI Cards in a Typical External I/O Expansion Unit (*Continued*)

Boat	Slot	PCI Card
	4	Dual Ultra320 SCSI adapter
	5	Dual gigabit Ethernet
	6	4 gigabit fibre channel

## C.3.1 The `ioxadm` Command

Use the `ioxadm` (8) command to display information about the External I/O Expansion Unit and to manage External I/O Expansion Unit functions. The `ioxadm` command is executed on the service processor of the host system.

The `ioxadm` command has three levels of user privileges: `platop` (platform operator or user), `platadm` (platform administrator), `fieldeng` (service or field engineer) The user's privilege level is set through the `setprivileges` (8) command.

**TABLE C-7** `ioxadm` Privileges and Commands

Required Privilege	Command	Description
<code>fieldeng</code> , <code>platadm</code> , <code>platop</code>	<b><code>ioxadm env</code></b>	Display the environmental state of the External I/O Expansion Unit or link card.
<code>fieldeng</code> , <code>platadm</code> , <code>platop</code>	<b><code>ioxadm list</code></b>	List information about the External I/O Expansion Unit, links, and External I/O Expansion Unit FRUs.
<code>fieldeng</code> , <code>platadm</code>	<b><code>ioxadm locator</code></b>	Display and set the status of the locator LED.
<code>fieldeng</code> , <code>platadm</code>	<b><code>ioxadm poweroff</code></b>	Power down External I/O Expansion Unit FRUs for replacement.
<code>fieldeng</code> , <code>platadm</code>	<b><code>ioxadm poweron</code></b>	Power up External I/O Expansion Unit FRUs for replacement.
<code>fieldeng</code>	<b><code>ioxadm reset</code></b>	Reinitialize External I/O Expansion Unit FRUs.
<code>fieldeng</code>	<b><code>ioxadm settled</code></b>	Set the state of External I/O Expansion Unit LEDs.

Refer to the `ioxadm` (8) man page for more information.

## C.3.2 The show-devs Command

The show-devs command displays the paths from the host system to the PCI cards in the I/O boat.

**CODE EXAMPLE C-1** Typical Output of the show-devs Command (1 of 3)

```
{0} ok show-devs
/pci@3,700000
/pci@2,600000
/pci@1,700000
/pci@0,600000
/pci@8,4000
/cmp@408,0
/cmp@400,0
/pseudo-mc@200,200
/nvram
/pseudo-console
/virtual-memory
/memory@m3c000000000
/aliases
/options
/openprom
/chosen
/packages
/pci@3,700000/pci@0
/pci@3,700000/pci@0/pci@9
/pci@3,700000/pci@0/pci@8
/pci@3,700000/pci@0/pci@1
/pci@3,700000/pci@0/pci@9/pci@0,1
/pci@3,700000/pci@0/pci@9/pci@0
/pci@3,700000/pci@0/pci@9/pci@0,1/scsi@4,1
/pci@3,700000/pci@0/pci@9/pci@0,1/scsi@4
/pci@3,700000/pci@0/pci@9/pci@0/network@4
/pci@3,700000/pci@0/pci@8/pci@0,1
/pci@3,700000/pci@0/pci@8/pci@0
/pci@3,700000/pci@0/pci@8/pci@0,1/SUNW,qlc@4,1
/pci@3,700000/pci@0/pci@8/pci@0,1/SUNW,qlc@4
/pci@3,700000/pci@0/pci@8/pci@0,1/SUNW,qlc@4,1/fp@0,0
/pci@3,700000/pci@0/pci@8/pci@0,1/SUNW,qlc@4,1/fp@0,0/disk
/pci@3,700000/pci@0/pci@8/pci@0,1/SUNW,qlc@4/fp@0,0
/pci@3,700000/pci@0/pci@8/pci@0,1/SUNW,qlc@4/fp@0,0/disk
/pci@3,700000/pci@0/pci@8/pci@0/pci@4
/pci@3,700000/pci@0/pci@8/pci@0/pci@4/scsi@2,1
/pci@3,700000/pci@0/pci@8/pci@0/pci@4/scsi@2
```

**CODE EXAMPLE C-1** Typical Output of the show-devs Command (2 of 3)

```
/pci@3,700000/pci@0/pci@8/pci@0/pci@4/network@1
/pci@3,700000/pci@0/pci@8/pci@0/pci@4/network@0
/pci@3,700000/pci@0/pci@8/pci@0/pci@4/scsi@2,1/tape
/pci@3,700000/pci@0/pci@8/pci@0/pci@4/scsi@2,1/disk
/pci@3,700000/pci@0/pci@8/pci@0/pci@4/scsi@2/tape
/pci@3,700000/pci@0/pci@8/pci@0/pci@4/scsi@2/disk
/pci@3,700000/pci@0/pci@1/pci@0,1
/pci@3,700000/pci@0/pci@1/pci@0
/pci@3,700000/pci@0/pci@1/pci@0,1/SUNW,qlc@4,1
/pci@3,700000/pci@0/pci@1/pci@0,1/SUNW,qlc@4
/pci@3,700000/pci@0/pci@1/pci@0,1/SUNW,qlc@4,1/fp@0,0
/pci@3,700000/pci@0/pci@1/pci@0,1/SUNW,qlc@4,1/fp@0,0/disk
/pci@3,700000/pci@0/pci@1/pci@0,1/SUNW,qlc@4/fp@0,0
/pci@3,700000/pci@0/pci@1/pci@0,1/SUNW,qlc@4/fp@0,0/disk
/pci@3,700000/pci@0/pci@1/pci@0/pci@4
/pci@3,700000/pci@0/pci@1/pci@0/pci@4/pci@4
/pci@3,700000/pci@0/pci@1/pci@0/pci@4/pci@0
/pci@3,700000/pci@0/pci@1/pci@0/pci@4/pci@4/network@3
/pci@3,700000/pci@0/pci@1/pci@0/pci@4/pci@4/network@2
/pci@3,700000/pci@0/pci@1/pci@0/pci@4/pci@0/network@1
/pci@3,700000/pci@0/pci@1/pci@0/pci@4/pci@0/network@0
/pci@2,600000/pci@0
/pci@2,600000/pci@0/pci@9
/pci@2,600000/pci@0/pci@8
/pci@2,600000/pci@0/pci@1
/pci@2,600000/pci@0/pci@9/pci@0
/pci@2,600000/pci@0/pci@9/pci@0/pci@9
/pci@2,600000/pci@0/pci@9/pci@0/pci@1
/pci@2,600000/pci@0/pci@9/pci@0/pci@0
/pci@2,600000/pci@0/pci@9/pci@0/pci@9/fibre-channel@0,1
/pci@2,600000/pci@0/pci@9/pci@0/pci@9/fibre-channel@0
/pci@2,600000/pci@0/pci@9/pci@0/pci@1/fibre-channel@0,1
/pci@2,600000/pci@0/pci@9/pci@0/pci@1/fibre-channel@0
/pci@2,600000/pci@0/pci@9/pci@0/pci@0/QLGC,qlc@0,1
/pci@2,600000/pci@0/pci@9/pci@0/pci@0/QLGC,qlc@0
/pci@2,600000/pci@0/pci@9/pci@0/pci@0/QLGC,qlc@0,1/fp@0,0
/pci@2,600000/pci@0/pci@9/pci@0/pci@0/QLGC,qlc@0,1/fp@0,0/disk
/pci@2,600000/pci@0/pci@9/pci@0/pci@0/QLGC,qlc@0/fp@0,0
/pci@2,600000/pci@0/pci@9/pci@0/pci@0/QLGC,qlc@0/fp@0,0/disk
/pci@2,600000/pci@0/pci@1/pci@0
/pci@2,600000/pci@0/pci@1/pci@0/pci@9
/pci@2,600000/pci@0/pci@1/pci@0/pci@1
/pci@2,600000/pci@0/pci@1/pci@0/pci@0
```

**CODE EXAMPLE C-1** Typical Output of the show-devs Command (3 of 3)

```
/pci@2,600000/pci@0/pci@1/pci@0/pci@9/network@0,1
/pci@2,600000/pci@0/pci@1/pci@0/pci@9/network@0
/pci@2,600000/pci@0/pci@1/pci@0/pci@1/network@0,1
/pci@2,600000/pci@0/pci@1/pci@0/pci@1/network@0
/pci@2,600000/pci@0/pci@1/pci@0/pci@0/network@0,1
/pci@2,600000/pci@0/pci@1/pci@0/pci@0/network@0
/pci@0,600000/pci@0
/pci@0,600000/pci@0/pci@9
/pci@0,600000/pci@0/pci@8
/pci@0,600000/pci@0/pci@1
/pci@0,600000/pci@0/pci@8/pci@0,1
/pci@0,600000/pci@0/pci@8/pci@0
/pci@0,600000/pci@0/pci@8/pci@0/pci@0,0@7
/pci@0,600000/pci@0/pci@8/pci@0/network@2,1
/pci@0,600000/pci@0/pci@8/pci@0/network@2
/pci@0,600000/pci@0/pci@8/pci@0/scsi@1
/pci@0,600000/pci@0/pci@8/pci@0/scsi@1/disk
/pci@0,600000/pci@0/pci@8/pci@0/scsi@1/tape
/pci@8,4000/ebus@1
/pci@8,4000/ebus@1/panel@14,280030
/pci@8,4000/ebus@1/scfc@14,200000
/pci@8,4000/ebus@1/serial@14,400000
/pci@8,4000/ebus@1/flashprom@10,0
/cmp@408,0/core@1
/cmp@408,0/core@0
/cmp@408,0/core@1/cpu@1
/cmp@408,0/core@1/cpu@0
/cmp@408,0/core@0/cpu@1
/cmp@408,0/core@0/cpu@0
/cmp@400,0/core@1
/cmp@400,0/core@0
/cmp@400,0/core@1/cpu@1
/cmp@400,0/core@1/cpu@0
/cmp@400,0/core@0/cpu@1
/cmp@400,0/core@0/cpu@0      /openprom/client-services
/packages/obp-tftp
/packages/terminal-emulator
/packages/disk-label
/packages/deblocker
/packages/SUNW,builtin-drivers
{0} ok
```

## C.3.3 The cfgadm Command

The `cfgadm` command displays devices connected to the main server bus. To use this command, refer to the `cfgadm (1M)` man page.

This is typical output of the `cfgadm` command;

**CODE EXAMPLE C-2** Typical Output of the `cfgadm` Command (1 of 2)

```
# cfmadm -la
```

Ap_Id	Type	Receptacle	Occupant	Condition
SB0	System_Brd	connected	configured	ok
SB0::cpu0	cpu	connected	configured	ok
SB0::cpu1	cpu	connected	configured	ok
SB0::memory	memory	connected	configured	ok
SB0::pci0	io	connected	configured	ok
SB0::pci1	io	connected	configured	ok
SB0::pci2	io	connected	configured	ok
SB0::pci3	io	connected	configured	ok
SB0::pci8	io	connected	configured	ok
SB1		disconnected	unconfigured	unknown
SB2		disconnected	unconfigured	unknown
...				
SB14		disconnected	unconfigured	unknown
SB15		disconnected	unconfigured	unknown
c0	scsi-bus	connected	configured	unknown
c0::disk/c0t0d0	disk	connected	configured	unknown
c0::disk/c0t1d0	disk	connected	configured	unknown
c0::disk/c0t3d0	CD-ROM	connected	configured	unknown
c0::rmt/0	tape	connected	configured	unknown
c1	fc-fabric	connected	configured	unknown
c1::2100000c5062606a	disk	connected	configured	unknown
c2	fc-fabric	connected	configured	unknown
c2::2100000c50628015	disk	connected	configured	unknown
...				
c14::disk/c14t11d0	disk	connected	configured	unknown
c14::es/ses1	processor	connected	configured	unknown
iou#0-pci#1	unknown	empty	unconfigured	unknown
iou#0-pci#2	unknown	empty	unconfigured	unknown
iou#0-pci#3	pci-pci/hp	connected	configured	ok
iou#0-pci#4	pci-pci/hp	connected	configured	ok
pci1	pci-pci/hp	connected	configured	ok
pci2	fibre/hp	connected	configured	ok
pci3	etherne/hp	connected	configured	ok
pci4	scsi/hp	connected	configured	ok
pci5	pci-pci/hp	connected	configured	ok
pci6	fibre/hp	connected	configured	ok
pciel1	etherne/hp	connected	configured	ok
pciel2	etherne/hp	connected	configured	ok

**CODE EXAMPLE C-2** Typical Output of the `cfgadm` Command (2 of 2)

pcie3	etherne/hp	connected	configured	ok
pcie4	fibre/hp	connected	configured	ok
pcie5	fibre/hp	connected	configured	ok
pcie6	fibre/hp	connected	configured	ok

## C.3.4 The `prtdiag` Command

The `prtdiag` command displays information about the server, including basic details about the PCI cards in the External I/O Expansion Unit. To use this command, refer to the `prtdiag (1M)` man page.

This is typical output of the `prtdiag` command

**CODE EXAMPLE C-3** Typical `prtdiag` Output

```
# prtdiag
System Configuration: Sun Microsystems sun4u Sun SPARC Enterprise (FF2) Server
System clock frequency: 1012 MHz
Memory size: 8192 Megabytes

===== CPUs =====

LSB      CPU      CPU      Run      L2$      CPU      CPU
Chip      ID      MHz      MB      Impl.     Mask
-----
00        0          0, 1, 2, 3 2150      4.0          6      129
00        1          8, 9, 10, 11 2150      4.0          6      129

===== Memory Configuration =====

LSB      Memory  Available  Memory  DIMM      Number of
Group    Size      Status     Size     DIMMs
-----
00      A      4096MB     okay     1024MB      4
00      B      4096MB     okay     1024MB      4

===== IO Cards =====

LSB      Name      Model
-----
00      scsi      LSI,1064
00      network   N/A
00      network   N/A
00      pci0,0     N/A
00      network   SUNW,pcie-no
00      network   SUNW,pcie-no
```

**CODE EXAMPLE C-3** Typical prttdiag Output

00	network	SUNW,pcie-no
00	network	SUNW,pcie-no
00	network	SUNW,pcie-no
00	network	SUNW,pcie-no
00	fp	N/A
00	network	SUNW,pcie-no
00	network	SUNW,pcie-no
00	network	SUNW,pcie-no
00	network	SUNW,pcie-no
00	network	SUNW,pcie-no
00	network	SUNW,pcie-no
00	fp	N/A
00	network	SUNW,pci-qge
00	network	SUNW,pci-qge
00	network	SUNW,pci-qge
00	network	SUNW,pci-qge
00	fp	N/A





# Troubleshooting

## D.1 Troubleshooting the External I/O Expansion Unit

TABLE D-1 Troubleshooting

Area	Symptom	Comments
Carrier	Carrier does not seat	<ul style="list-style-type: none"><li>• Pull the carrier handle out fully before inserting the carrier in the I/O boat slot. The PCI card and carrier plate will strike the card socket if the handle is not fully retracted.</li><li>• The carrier is not correctly seated in the upper or lower card guide.</li><li>• A type C lock is in the wrong location and is hitting the card socket.</li></ul>
	Carrier handle requires excessive pressure to close	<ul style="list-style-type: none"><li>• The PCI card is not mounted correctly on the carrier. If the PCI card is tilted by even a small angle on the carrier, it might not seat correctly.</li><li>• The PCI card does not fit socket. The card might be the incorrect type for the I/O boat. (Note that the PCI-X card socket is approximately twice the length of a PCI Express socket.)</li><li>• The PCI Express boat does not accept x16 PCI Express cards. This boat accepts only x8 PCI Express cards or smaller.</li></ul>

**TABLE D-1** Troubleshooting (*Continued*)

Area	Symptom	Comments
Host	Host or service processor does not recognize PCI card or cards	<ul style="list-style-type: none"> <li>For the optical link kit, the link cables might be reversed. The TX socket on each link card should connect to the RX socket on the other link card. Note that each optical cable connects a TX socket to an RX socket.</li> <li>The PCI card might not be seated completely. Remove the card and carrier and verify that the card is properly attached to the carrier. See <a href="#">PCI card</a> in this table.</li> </ul>
LEDs		<ul style="list-style-type: none"> <li>See <a href="#">Appendix B</a> for LED information.</li> </ul>
PSU	Fan does not turn on, LEDs do not light	<ul style="list-style-type: none"> <li>The PSU is not receiving DC current from the second PSU. Note: The PSUs share DC current, so the fan and LEDs should operate if the second PSU is running normally.</li> <li>Verify that the PSU is seated. Close the PSU handle and tighten the handle locking screw.</li> </ul>
	The fan operates, but the PSU does not come on line.	<ul style="list-style-type: none"> <li>The PSU might not have AC input. Note: The PSUs share DC current, but do not share AC current. Verify that both of the internal AC cables are connected to AC voltage through the AC cords supplied with the External I/O Expansion Unit (<a href="#">FIGURE 2-16</a>).</li> <li>Check external circuit breakers.</li> <li>PSU AC switches must be in the On position.</li> </ul>
PCI card	PCI card or carrier is difficult to seat in the boat, or the card moves out of position on carrier	<ul style="list-style-type: none"> <li>The card locks might be loose, allowing the card to tilt. Reposition the card and tighten the card locks. It is most important that the card lock(s) at the back* of the card press tightly against the back of the card.</li> <li>Excessive pressure on the card locks might have bent the card bracket (<a href="#">FIGURE 1-19</a>)</li> <li>(PCI Express boat only) The boat supports cards only up to x8 widths. X16 PCI Express cards are not supported.</li> <li>The card might not fit the socket in the boat. The card may be the wrong type for the PCI Express or PCI-X socket. Verify that there is no broken plastic lying inside the socket.</li> </ul>
	PCI card is difficult to install on the carrier	<ul style="list-style-type: none"> <li>The top of the card bracket must fit over the alignment post inside the carrier front housing (<a href="#">FIGURE 1-21</a>).</li> <li>The bottom of the card bracket might be hooked behind the RFI gasket inside the carrier front housing (<a href="#">FIGURE 1-22</a>)</li> <li>The bottom of the card may be hitting the alignment tab at the bottom front of the carrier (lower detail in <a href="#">FIGURE 1-20</a>).</li> </ul>

\* This refers to the horizontally-sliding card lock(s). The fitting of the vertically-sliding card lock(s) are less critical.

# Glossary

---

The following terms are used in this document.

---

## B

### **backplane (BP)**

A circuit board containing a set of sockets to which other circuit boards can be connected. Pins on the backplane sockets are interconnected by printed wire traces. This allows components on the connected circuit boards to distribute signals to components on other connected boards.

---

## C

**centerplane** See *backplane (BP)*.

---

## D

**downlink card** Connection interface card of IOU, used to connect IOU and I/O-box (boat).

---

## E

### **External I/O Expansion**

**Unit** A rackmountable device to add-on PCI slots. It is connected to the system's I/O unit through the PCIe bus and can mount up to six PCI-X or PCIe cards.

---

## H

**hot-plug** A FRU that requires preparation in order to be installed or removed from the server.

**hot-swap** A FRU that can be replaced without prior preparation.

---

## I

**I/O Box** External I/O expansion unit may be described as IOBOX in programs and manuals.

**I/O boat** An I/O unit on the I/O Expansion box. The I/O boat connects to a PCI Express (PCIe) or a PCI-X slot through a PCI Express switch or a PCI-X bridge on the I/O boat. There are six PCI-X slots and six PCI Express (PCI-E) slots on the I/O boat.

---

## L

**link cables** The interface cables link card in a host system to the ink card in an I/O boat.

**link card** Connection interface card of IOU, used to connect IOU and I/O-box (boat).

**low-profile** PCI cards are available in a variety of heights, "full height" and shorter. Low profile cards are of the short type, designed for host systems that have restricted space for card slots.

---

## P

- PCI carrier** The assembly on which a PCI card is mounted for use in an External I/O Expansion Unit. A PCI carrier is similar in function to the PCI cassette used in the SPARC Enterprise M4000/M5000/M8000/M9000 servers. The PCI carrier and the PCI cassette are not interchangeable.
- PCI cassette** A container for a PCI card. There are two varieties: PCIe and PCI-X.
- PCI Express (PCIe)** A high-speed serial, point-to-point interconnect.
- PCIE** On the PCI carrier, the label for [PCI Express \(PCIe\)](#) displays PCIE *n*.
- PCI-X** A faster version of the parallel bus PCI standard. The PCI-X bus has improved protocols and a faster clock rate. On the product
- PCIX** On the PCI carrier, the label for [PCI-X](#) displays PCIX *n*.

---

## U

- uplink card** Connection interface card of I/O boat, used to connect IOU and External I/O Expansion Unit (boat).



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